SUMMARY REPORT

SANTA CLARA VALLEY WATER DISTRICT

Groundwater Vulnerability Pilot Study

INVESTIGATION OF MtBE OCCURRENCE ASSOCIATED WITH OPERATING UST SYSTEMS

Volume 2 of 3
Site Reports 065 to 437
Part 1 of 2

July 22, 1999
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065

SANTA CLARA VALLEY WATER DISTRICT

Pilot Study of Operating Underground Storage Tanks
Santa Clara County, California

Site Report

SITE NUMBER 065

Chevron #93314
1030 Leigh Street
San Jose, California 95126

April 27, 1999

This Site Report is one of a series of reports prepared for the Santa Clara Valley Water District's Pilot Study of Operating Underground Storage Tanks. The District funded this study to assess if MtBE is being released from UST systems that meet 1998 federal- and state-mandated upgrade requirements. The District will use the results of the Pilot Study, and possibly information obtained during subsequent investigations, to evaluate whether up-graded UST systems that handle MtBE are protective of groundwater quality, and ultimately drinking water. This Study and other District groundwater vulnerability assessments are critical in formulating a plan to protect drinking water supplies into the future.

With cooperation from the site owner and operator and the assistance of the San Jose Fire Department, LFR Levine·Fricke completed a file review, site inspection, and soil-gas, soil, and groundwater sampling at this site on behalf of the District. LFR's subcontractor, Integrated Engineering Services, completed a UST inspection at this site. This report provides a brief summary of investigation findings, and site-specific data in tables, figures, and appendices. This Site Report is appended to the Summary Report for the Study.

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SUMMARY OF FINDINGS

SITE DESCRIPTION

Figure 1 illustrates the site location. Site geology consists primarily of sandy silts and clays to approximately 32 feet below the ground surface (bgs). A sand to gravelly sand interval, up to 5 feet thick, was encountered at 14 feet bgs beneath most of the site. Two gravel and gravelly sand intervals, up to 18 feet thick, were encountered at approximately 32 and 54 feet bgs. The shallowest depth to water was measured at approximately 66 feet bgs (December 1998).

SYSTEM DESCRIPTION

The UST system at the site consists of two 12,000-gallon double-walled gasoline USTs constructed of 100 % methanol compatible fiberglass reinforced plastic [FRP] with double-walled 100 % methanol compatible FRP piping. The UST system utilizes both mechanical and automatic line leak detection for piping and manual inventory reconciliation and continuous interstitial monitoring for the USTs.

RESULTS

MtBE was detected in soil at this Site. MtBE was not detected in any of the 23 soil-gas samples or 3 groundwater samples collected. MtBE was detected in 7 of the 17 soil samples collected at concentrations ranging from 5.1 μg/kg to 49 μg/kg. Petroleum hydrocarbons (benzene, toluene, ethylbenzene, and/or xylenes) were detected at low concentrations in soil-gas, soil, and groundwater samples. Only xylene was detected in groundwater at a concentration of 1.5 μg/l.

SITE SELECTION CRITERIA MET

1998 upgrade compliant?	Yes
On SCVWD fuel leak database?	No
Status:	Not applicable
Distance from LUST site:	Greater than 250 feet
Distance to water supply well:	Less than 2000 feet
Access granted?	Yes
SCVWD approved?	Yes

FILE REVIEW SUMMARY

Number of tanks:	2
Reported release?	No
Release date:	Not applicable
Fuel released:	Not applicable
Location:	Not applicable
Quantity (gallons):	Not applicable
Data available:	Not applicable

Comments:

SITE VISIT - UST SYSTEM INFORMATION

Precision tank tightness records available?	No
Date of last test:	Not applicable
Method of tank testing:	Not applicable
Tank leak rate (gallons/hour):	Not applicable
UST overfill prevention system present?	Yes
Type of system:	Both overfill limiter and drop tube/check-valve
Automatic shut-off?	Yes
System operational?	Yes
Overfill containment (gallons):	15
Drop tube equipped with striker plate?	Yes
Under island containment present?	Yes
Under island containment monitoring:	Liquid probe
Quick release dispenser hoses?	Yes
Alarm system functional?	Yes
Type:	Shut-Off
Vents:	
Vent type:	Dedicated
Vent piping:	Single walled
Condition of UST turbine sump:	Poor
Condition of UST flex line sump:	Fair
Vapor recovery system:	Balanced
Years of operation since upgrade:	Approximately 4 years
Years of operation as fueling facility:	At least 27 years
Estimated throughput:	100,000 to 300,000 gallons per month
Monitoring systems operational?	Yes
Systems operations, comment:	Functionally tested liquid probes in each turbine sump. Print out from monitoring system indicates that all warnings are disabled.
Tank annular space monitoring:	Liquid probe
Overfill containment monitoring system:	Liquid probe
Piping leak detection:	Combined (pressure line leak detection and liquid probe)
Is system monitored?	Yes
Station inventory records available?	Not available
Records up to date?	Not applicable
Records complete?	Not applicable
Supplier log reviewed?	Not available
Spill log reviewed?	No
Spill log comments:	None maintained
Personnel training:	Not noted

Comments:

92 product tank had substantial water in the turbine sump with a slight sheen. Liquid probes in sumps had been relocated to the apex of the tank, apparently to eliminate alarms due to water

intrusion.

SITE INSPECTION

Condition of apron around pumps:	Not noted
Evidence of recent paving/regrading?	No
Location of recent paving/regrading:	Not applicable
Description of surface drainage?	To west
Direct route for surface spills to subsurface?	Possible
Description of route to subsurface:	Storm drains
Other potential petroleum sources?	Yes
Description of other petroleum sources:	Service bay
Nearby surface water?	No
Name of surface water:	Not applicable
Type of surface water:	Not applicable
Comments:	

UST SYSTEM DATA FROM FORM B COLLECTED DURING FILE REVIEWS - TANK ID # 2

Date installed:	1995
Tank capacity (gallons):	12,000
Tank contents:	Midgrade unleaded
Tank construction:	
Type of system:	Double wall
Tank material (primary tank):	100% methanol compatible with fiberglass reinforced plastic
Lining compatible with 100% methanol:	No
Exterior corrosion protection:	Fiberglass reinforced plastic
Date spill containment installed:	1995
Date overfill protection equipment installed:	1995
Drop tube:	Not noted
Striker plate:	Not noted
Dispenser containment:	Not noted
Piping information:	
System type:	Pressure, underground
Construction:	Double wall, underground
Material and corrosion protection:	100% methanol compatible, underground
Leak detection:	Automatic line leak detector
Tank leak detection?	Manual inventory reconciliation Continuous interstitial monitoring

UST SYSTEM DATA FROM FORM B COLLECTED DURING FILE REVIEWS - TANK ID # 3

Date installed:	1995
Tank capacity (gallons):	12,000
Tank contents:	Premium unleaded
Tank construction:	
Type of system:	Double wall
Tank material (primary tank):	100% methanol compatible with fiberglass reinforced plastic
Lining compatible with 100% methanol:	No
Exterior corrosion protection:	Fiberglass reinforced plastic
Date spill containment installed:	1995
Date overfill protection equipment installed:	1995
Drop tube:	Not noted
Striker plate:	Not noted
Dispenser containment:	Not noted
Piping information:	
System type:	Pressure, underground
Construction:	Double wall, underground
Material and corrosion protection:	
Leak detection:	Automatic line leak detector
Tank leak detection?	Manual inventory reconciliation Continuous interstitial monitoring

Table 1
Summary of Chemical Analysis Results for Soil-Gas Samples - Site #065
Santa Clara Valley Water District

Location	Date Sampled	Depth (ft bgs)	Methyl Tertiary Butyl Ether (MTBE) ug/L	TPH as Gasoline (TPHg) ug/L	Benzene (B) ug/L	Toluene (T) ug/L	Ethyl Benzene (E) ug/L	meta/para-Xylenes (m/p-X) ug/L	ortho-Xylene (o-X) ug/L	Notes
065-SG-01	11/23/98	5	<5	<100	<1	<1	<1	5.7	<1	
		12	<5	<100	<1	<1	<1	<1	<1	
		16	<5	<100	<1	<1	<1	<1	<1	
		30	<5	<100	<1	<1	<1	<1	<1	
065-SG-02	11/23/98	5	<5	<100	<1	<1	<1	<1	<1	
		12	<5	<100	<1	<1	<1	<1	2.8	
		16	<5	<100	<1	<1	<1	<1	<1	
065-SG-02-DUP		16	<5	<100	<1	<1	<1	<1	<1	
065-SG-03	11/23/98	5	<5	<100	<1	<1	<1	<1	<1	
		12	<5	<100	<1	5.8	<1	<1	<1	
		16	<5	<100	<1	<1	<1	<1	1.4	
065-SG-04	11/23/98	5	<5	<100	<1	1.2	<1	<1	<1	
		12	<5	<100	<1	<1	<1	<1	<1	
065-SG-05	11/24/98	5	<5	<100	<1	<1	<1	<1	<1	
		12	<5	<100	<1	<1	<1	<1	<1	
065-SG-06	11/24/98	5	<5	<100	<1	<1	<1	<1	<1	
		12	<5	<100	<1	<1	<1	<1	<1	
065-SG-07	11/24/98	5	<5	<100	<1	<1	<1	<1	<1	
		12	<5	<100	<1	<1	<1	<1	<1	
065-SG-07-SPL		12	<0.010	NA	0.0039 J	0.031	0.0044 J	0.018 J	0.0057 J	(a)
065-SG-08	11/24/98	5	<5	<100	<1	<1	<1	<1	<1	
		12	<5	<100	<1	<1	<1	<1	<1	
065-SG-08-DUP		12	<5	<100	<1	<1	<1	<1	<1	

Table proofed by CLC.

Notes:
(a) Other analytes detected: Ethanol (0.017 ug/L)
All primary and field duplicate (-DUP) samples were analyzed on site by InterPhase, of Los Angeles, CA using EPA Method 8020 for MTBE and BTEX, and Modified EPA Method 8015 for TPHg.
Additional field duplicate samples (-SPL) were analyzed off site by Air Toxics, Ltd., Folsom, CA using EPA Method TO-14.
ft bgs = feet below ground surface
NA = Not analyzed
TPH = total petroleum hydrocarbons
ug/L = micrograms per liter

Data Qualifiers (if shown on table):
E = Exceeds the calibration range
I = Interference by the sample matrix
J = Estimated value
UJ = Not detected at the estimated reporting limit shown

T[illegible]e 2
Summary of Chemical Analysis Results for Soil Samples - Site #065
Santa Clara Valley Water District

Location	Date Sampled	Depth (ft bgs)	Methyl Tertiary Butyl Ether (MTBE) ug/Kg	TPH as Gasoline (TPHg) mg/Kg	Benzene (B) ug/Kg	Toluene (T) ug/Kg	Ethyl Benzene (E) ug/Kg	meta/para-Xylenes (m/p-X) ug/Kg	ortho-Xylene (o-X) ug/Kg	Di-isopropyl Ether (DIPE) ug/Kg	Ethyl Tertiary Butyl Ether (ETBE) ug/Kg	Tertiary Amyl Methyl Ether (TAME) ug/Kg	Tertiary Butyl Alcohol (TBA) ug/Kg
065-BH-01	12/04/98	7.5-8.0	19	<1	<5	46	<5	9.1	<5	<20	<20	<20	<200
		11.0-11.5	38	<1	9.4	120	7.9	25	6	<20	<20	<20	<200
		17.0-17.5	14	<1	<5	19	<5	<5	<5	<20	<20	<20	<200
		25.5-26.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
065-BH-02	12/07/98	7.5-8.0	15	<1	<5	37	<5	6.9	<5	<20	<20	<20	<200
		10.0-10.5	49	<1	9.9	130	8	24	6.1	<20	<20	<20	<200
		19.0-19.5	5.1	<1	<5	16	<5	<5	<5	<20	<20	<20	<200
		40.5-41.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
065-BH-03	12/07/98	5.5-6.0	<5	<1	<5	6.9	<5	<5	<5	<20	<20	<20	<200
		11.0-11.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		19.0-19.5	6.2	<1	<5	18	<5	<5	<5	<20	<20	<20	<200
065-BH-04	12/08/98	5.5-6.0	<5	<1	<5	8	<5	<5	<5	<20	<20	<20	<200
		10.5-11.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		16.5-17.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
065-BH-05	12/08/98	6.0-6.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		11.0-11.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		20.0-20.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200

Table proofed by CLC.

Notes:

All samples were analyzed by Alpha Analytical, Inc. of Sparks, NV, using EPA Method 8260 for MTBE, BTEX, DIPE, ETBE, TAME, and TBA, and Modified EPA Method 8015 for TPHg.
ft bgs = feet below ground surface
mg/Kg = milligrams per kilogram
TPH = total petroleum hydrocarbons
ug/Kg = micrograms per kilogram

Data Qualifiers (if shown on table):

J = Estimated value
UJ =Not detected at the estimated reporting limit shown

Table 3

Summary of Chemical Analysis Results for Groundwater Samples - Site # 065

Santa Clara Valley Water District

Location	Date Sampled	Depth (ft bgs)	Methyl Tertiary Butyl Ether (MTBE) ug/L	TPH as Gasoline (TPHg) mg/L	Benzene (B) ug/L	Toluene (T) ug/L	Ethyl Benzene (E) ug/L	meta/para-Xylenes (m/p-X) ug/L	ortho-Xylene (o-X) ug/L	Di-isopropyl Ether (DIPE) ug/L	Ethyl Tertiary Butyl Ether (ETBE) ug/L	Tertiary Amyl Methyl Ether (TAME) ug/L	Tertiary Butyl Alcohol (TBA) ug/L
065-BH-01	12/04/98	57.0-67.0	<0.5	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<10
065-BH-02	12/07/98	70.5-72.5	<0.5	<0.05	<0.5	<0.5	<0.5	<0.5	1.5	<1	<1	<1	<10
065-BH-04	12/08/98	63.0-73.0	<0.5	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<10
065-BH-04-DUP		63.0-73.0	<0.5	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<10

Table proofed by CLC.

Notes:

All primary and field duplicate (-DUP) samples were analyzed by Alpha Analytical, Inc. of Sparks, NV, using EPA Method 8260 for MTBE, BTEX, DIPE, ETBE, TAME, and TBA, and Modified EPA Method 8015 for TPHg.

ft bgs = feet below ground surface

mg/L = milligrams per liter

TPH = total petroleum hydrocarbons

ug/L = micrograms per liter

Data Qualifiers (if shown on table):

J = Estimated value

UJ =Not detected at the estimated reporting limit shown

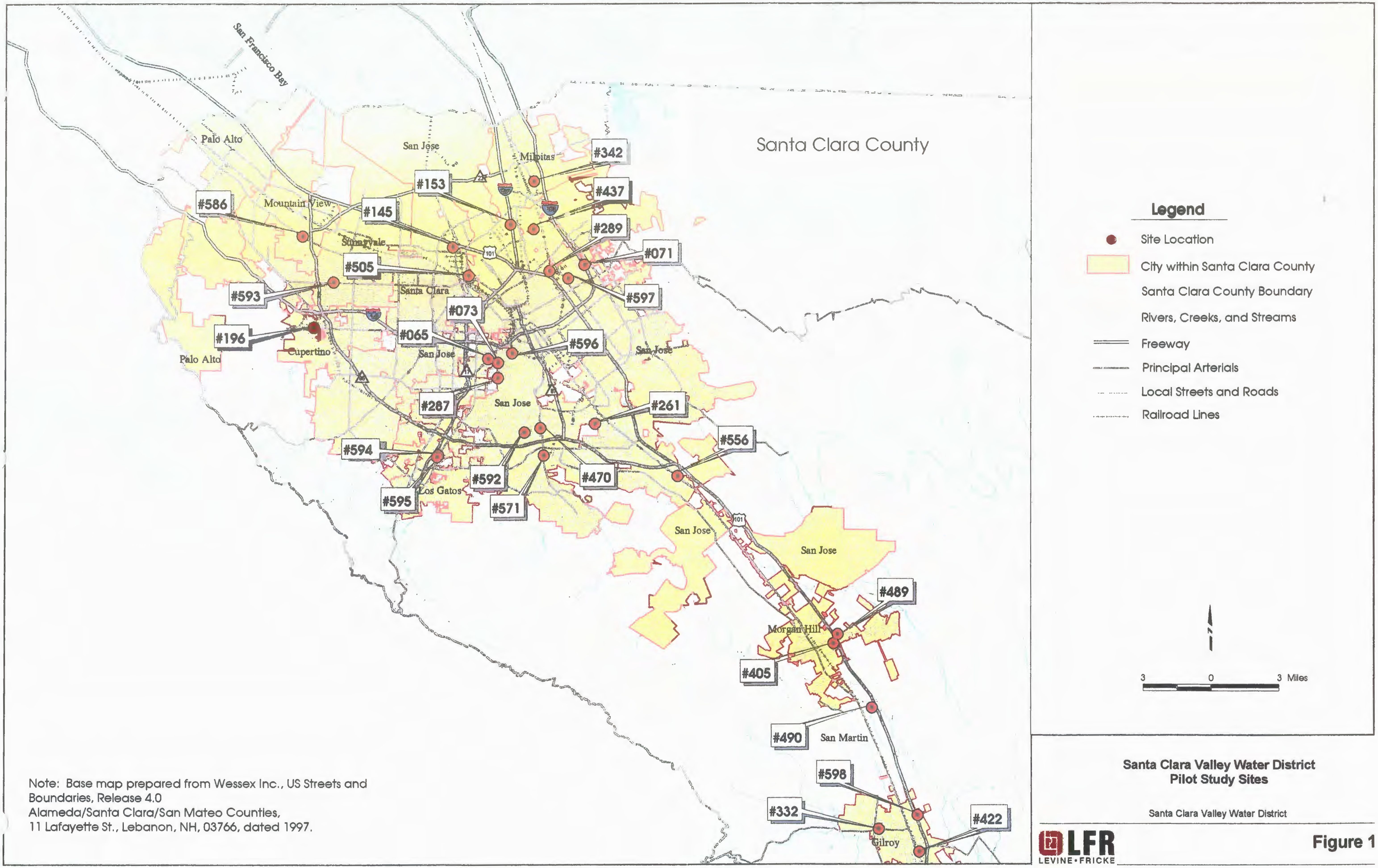
Table 4
Summary of Physical Parameters for Soil Samples - Site #065
Santa Clara Valley Water District

Location	Depth (ft bgs)	Visual Description	Total Organic Carbon (percent)	Moisture Content (percent)	Wet Weight (lbs/cu.ft.)	Dry Unit Weight (lbs/cu.ft.)	Porosity (percent)
065-BH-01	13.0 - 13.5	Brown fine sandy silty clay	0.10	14.26	125.9	110.2	34.58
	23.0 - 23.5	Brown fine sandy silty clay with trace gravel	0.08	19.14	128.5	107.9	35.94
	34.5 - 35.0	Gray brown gravelly sand	0.06	6.13	143.8	135.5	19.56

Table proofed by CLC.

Notes:

Specific gravity values were 2.70 for all samples analyzed.
Total organic carbon analyses were performed by Curtis and Tompkins Analytical Laboratories, Berkeley, CA.
All other analyses were performed by URS Greiner Woodward Clyde, Oakland, CA.
ft bgs = feet below ground surface
lbs/cu.ft. = pounds per cubic foot
NA = Not analyzed

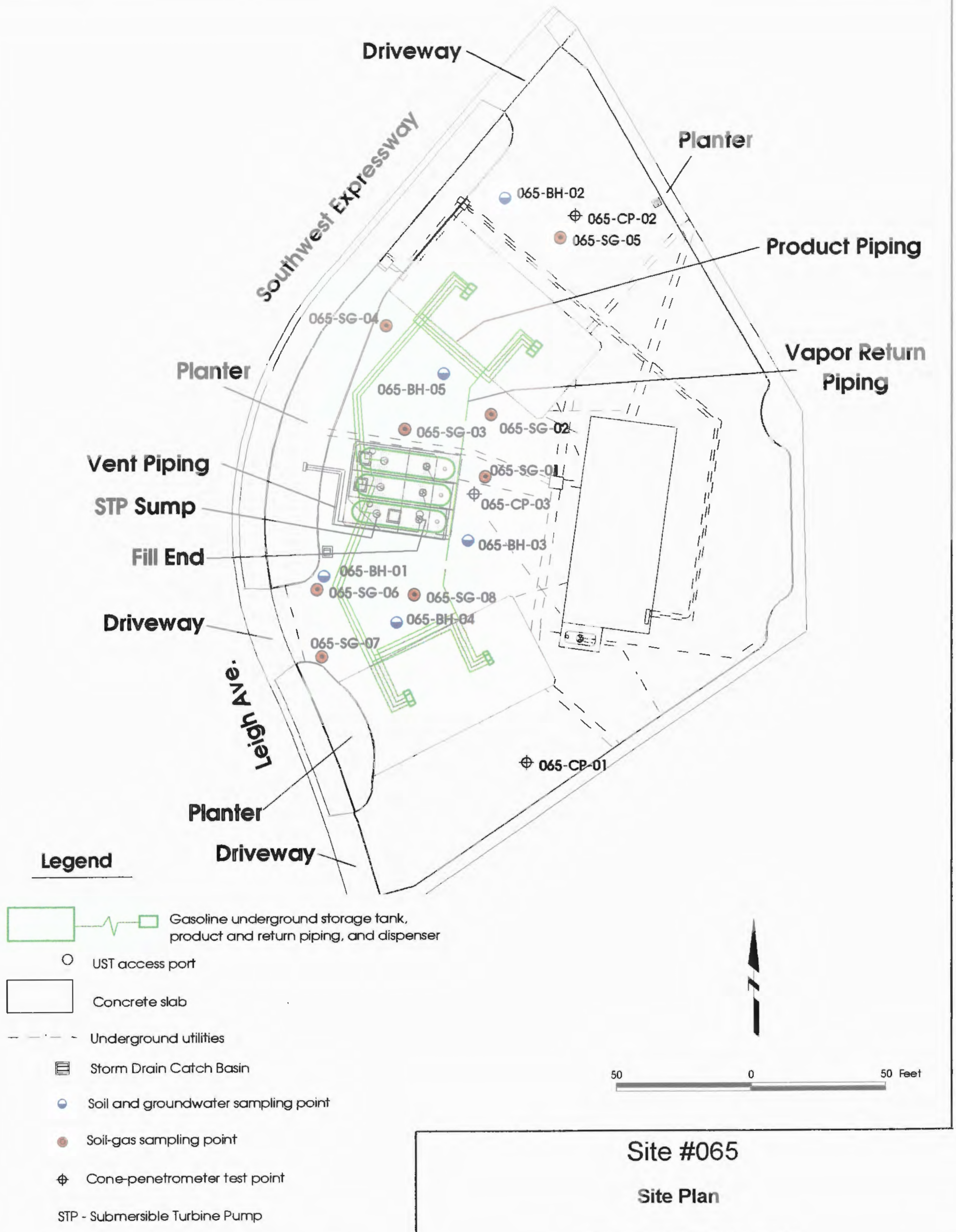


Note: Base map prepared from Wessex Inc., US Streets and Boundaries, Release 4.0
Alameda/Santa Clara/San Mateo Counties,
11 Lafayette St., Lebanon, NH, 03766, dated 1997.

Santa Clara Valley Water District
Pilot Study Sites

Santa Clara Valley Water District

Figure 1



Note: Base map prepared from Electrical Site Plan, Sheet E-1, 9-3314, 1030 Leigh Ave., San Jose, CA, Chevron, Northwest Region, by Robert H. Lee & Associates, Inc., of Petaluma, CA, dated 8/23/99.

Site #065

Site Plan

Santa Clara Valley Water District

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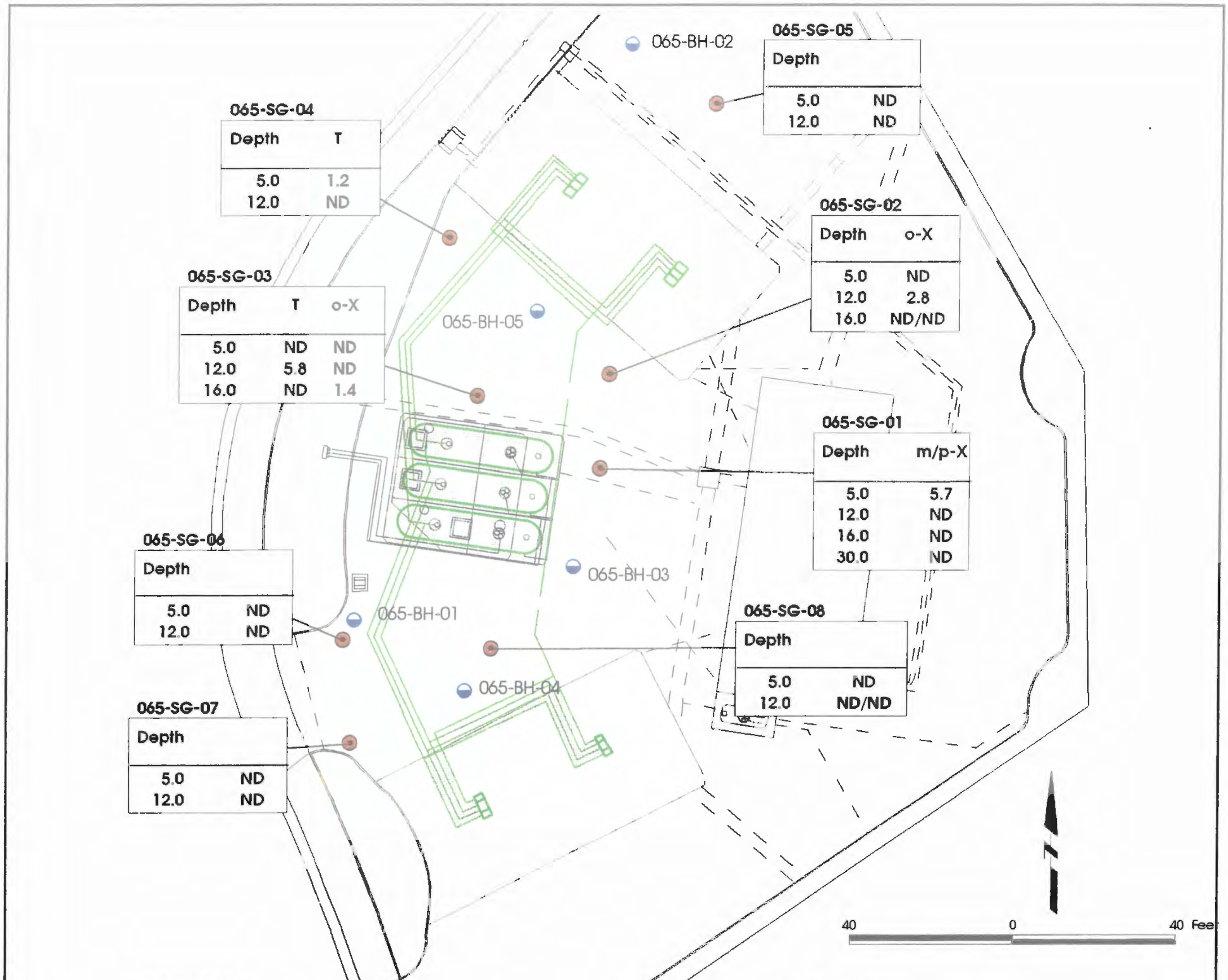
Figure 2



Legend

● Soil-gas sampling location

● Soil and groundwater sampling location

The following represents a hypothetical sampling point and defines the characters associated with that point:

Sample Location ——— ###-SG-01

Depth	m/p-X	T
5.0 12.0	2.5 1.0/1.2	4.1 ND/ND

Depth in feet

Result of primary analysis

Result of duplicate analysis when applicable

🟩 Gasoline underground storage tank, product and return piping, and dispenser

○ UST access port

▭ Concrete slab

— — — Underground utilities

▤ Storm Drain Catch Basin

See Figure 2 for description of site features and origin of base map.

Notes

Concentrations of analytes detected are presented; analytes not detected are not presented or are presented as ND (not detected). MTBE and BTEX were analyzed using EPA Method 8020 and TPHg was analyzed using Modified EPA Method 8015.

Results in micrograms/liter (ug/L)
RL = Reporting Limit

Each sample was analyzed for the following:

MTBE = Methyl Tertiary Butyl Ether (RL = 5 ug/L)
TPHg = Total Petroleum Hydrocarbons as Gasoline (RL = 100 ug/L)
B = Benzene (RL = 1 ug/L)
T = Toluene (RL = 1 ug/L)
E = Ethyl Benzene (RL = 1 ug/L)
m/p-X = meta/para-Xylenes (RL = 1 ug/L)
o-X = ortho-Xylene (RL = 1 ug/L)

Site #065

Summary of Chemical Analysis Results for Soil-Gas Samples

Santa Clara Valley Water District

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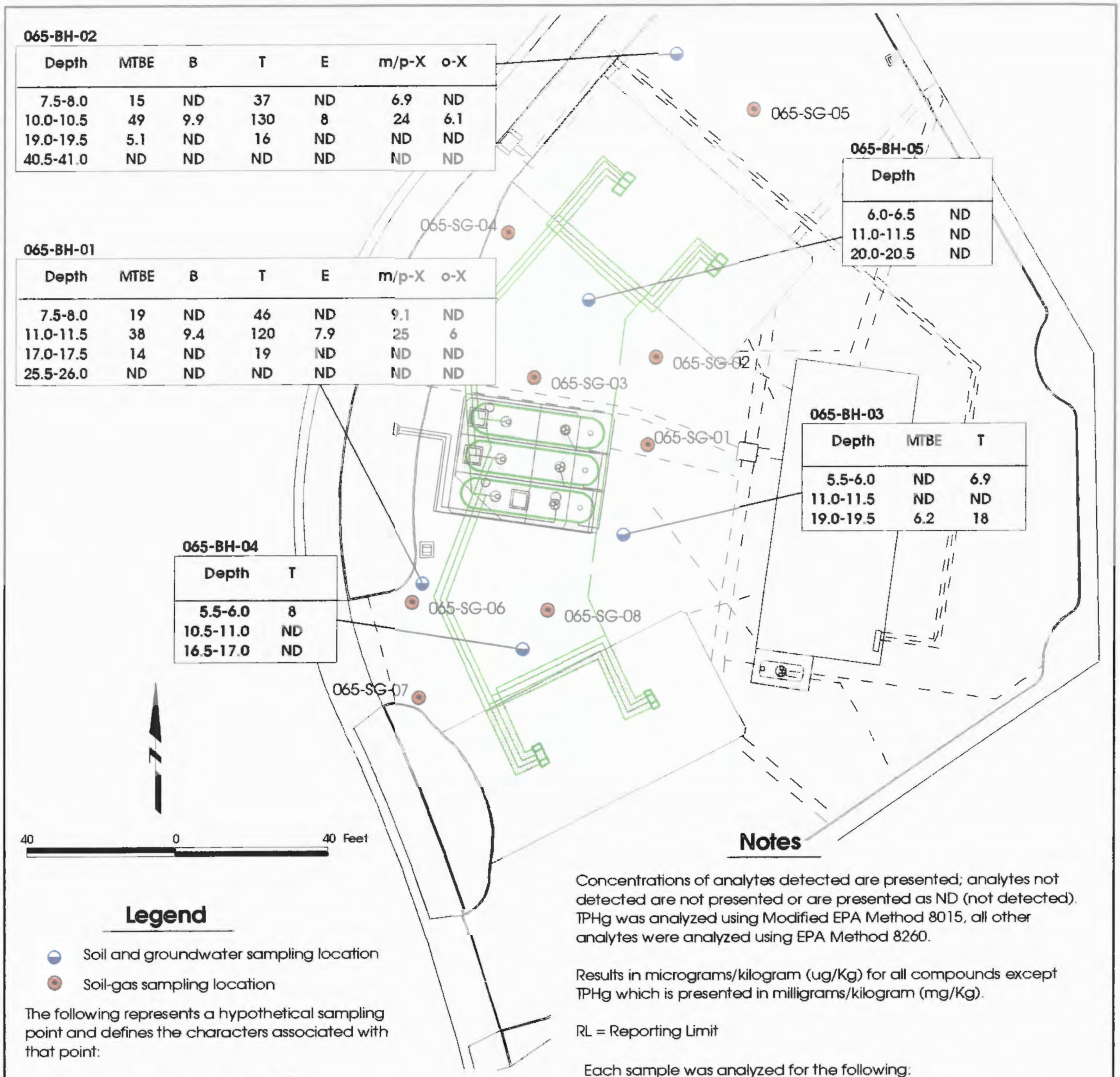
Figure 3



065-BH-02

Depth	MTBE	B	T	E	m/p-X	o-X
7.5-8.0	15	ND	37	ND	6.9	ND
10.0-10.5	49	9.9	130	8	24	6.1
19.0-19.5	5.1	ND	16	ND	ND	ND
40.5-41.0	ND	ND	ND	ND	ND	ND

065-BH-01

Depth	MTBE	B	T	E	m/p-X	o-X
7.5-8.0	19	ND	46	ND	9.1	ND
11.0-11.5	38	9.4	120	7.9	25	6
17.0-17.5	14	ND	19	ND	ND	ND
25.5-26.0	ND	ND	ND	ND	ND	ND

065-BH-05

Depth	
6.0-6.5	ND
11.0-11.5	ND
20.0-20.5	ND

065-BH-03

Depth	MTBE	T
5.5-6.0	ND	6.9
11.0-11.5	ND	ND
19.0-19.5	6.2	18

065-BH-04

Depth	T
5.5-6.0	8
10.5-11.0	ND
16.5-17.0	ND

Legend

◐ Soil and groundwater sampling location

● Soil-gas sampling location

The following represents a hypothetical sampling point and defines the characters associated with that point:

Sample Location — ###-BH-01

Depth	m/p-X	T
5.5-6.0	6.2	7.5
12.0-12.5	5.1/5.3	ND/ND

Depth in feet

Result of primary analysis

Result of duplicate analysis when applicable

🟩 Gasoline underground storage tank, product and return piping, and dispenser

○ UST access port

☐ Concrete slab

▤ Storm Drain Catch Basin

— — — — Underground Utilities

See Figure 2 for description of site features and origin of base map.

Notes

Concentrations of analytes detected are presented; analytes not detected are not presented or are presented as ND (not detected). TPHg was analyzed using Modified EPA Method 8015, all other analytes were analyzed using EPA Method 8260.

Results in micrograms/kilogram (ug/Kg) for all compounds except TPHg which is presented in milligrams/kilogram (mg/Kg).

RL = Reporting Limit

Each sample was analyzed for the following:

MTBE = Methyl Tertiary Butyl Ether (RL = 5 ug/Kg)
TPHg = Total Petroleum Hydrocarbons as Gasoline (RL = 1 mg/Kg)
B = Benzene (RL = 5 ug/Kg)
T = Toluene (RL = 5 ug/Kg)
E = Ethyl Benzene (RL = 5 ug/Kg)
m/p-X = meta/para-Xylenes (RL = 5 ug/Kg)
o-X = ortho-Xylene (RL = 5 ug/Kg)
DIPE = Di-isopropyl Ether (RL = 20 ug/Kg)
ETBE = Ethyl Tertiary Butyl Ether (RL = 20 ug/Kg)
TAME = Tertiary Amyl Methyl Ether (RL = 20 ug/Kg)
TBA = Tertiary Butyl Alcohol (RL = 200 ug/Kg)

Site #065

Summary of Chemical Analysis Results for Soil Samples

Santa Clara Valley Water District

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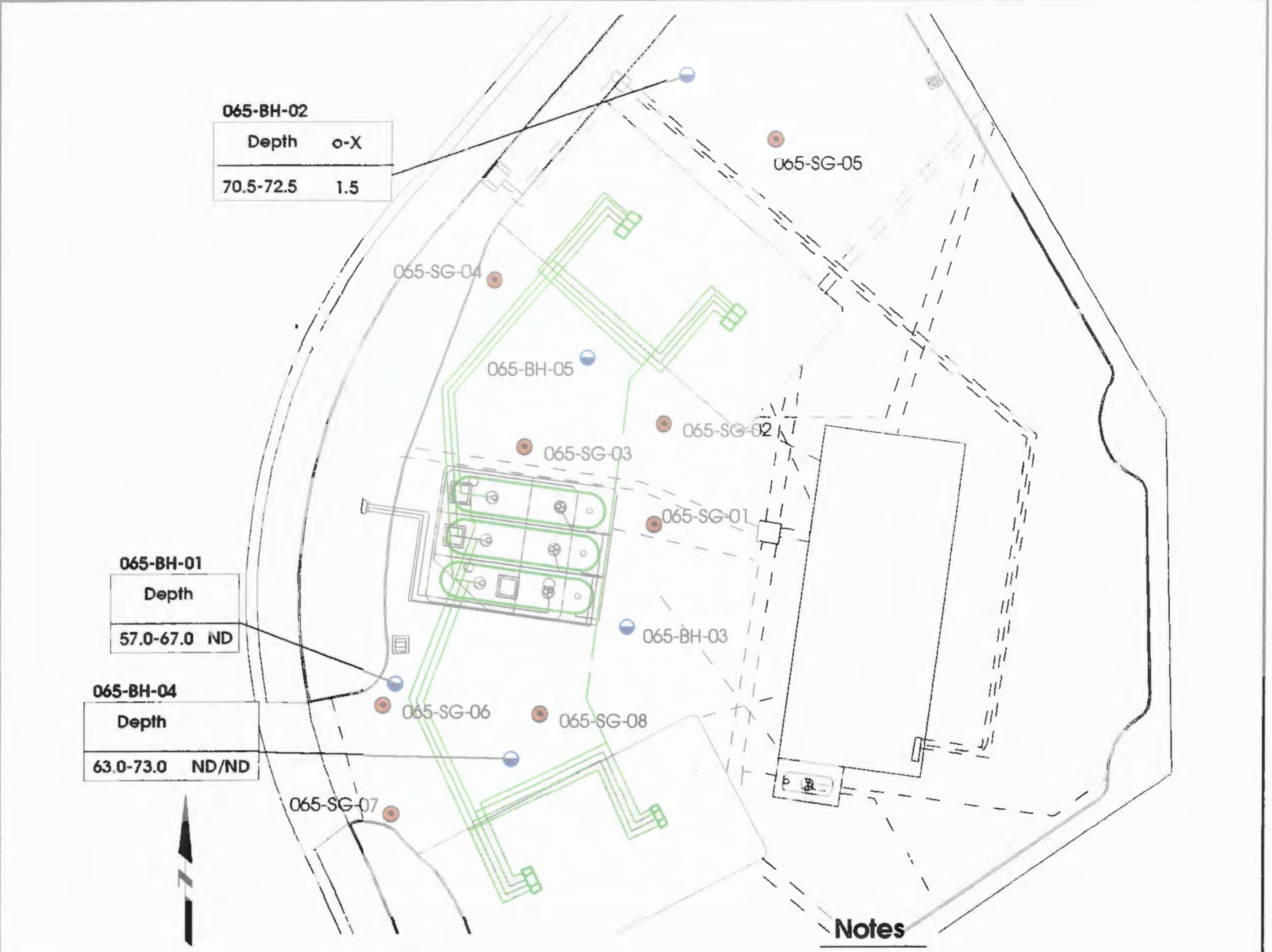
Figure 4



Legend

● Soil and groundwater sampling location

● Soil-gas sampling location

The following represents a hypothetical sampling point and defines the characters associated with that point:

Sample Location — ###-BH-01

Depth	m/p-X	T
5.5-6.0	6.2	7.5
12.0-12.5	5.1/5.3	ND/ND

Depth in feet

Result of primary analysis

Result of duplicate analysis when applicable

🟩 Gasoline underground storage tank, product and return piping, and dispenser

○ UST access port

▭ Concrete slab

– – – Underground utilities

▤ Storm Drain Catch Basin

See Figure 2 for description of site features and origin of base map.

Notes

Concentrations of analytes detected are presented; analytes not detected are not presented or are presented as ND (not detected). TPHg was analyzed using Modified EPA Method 8015, all other analytes were analyzed using EPA Method 8260.

Results in micrograms/liter (ug/L) for all compounds except TPHg which is presented in milligrams/liter (mg/L).

RL = Reporting Limit

* Indicates elevated RL (see results table for reporting limits)

Each sample was analyzed for the following:

MTBE = Methyl Tertiary Butyl Ether (RL = 0.5 ug/L)
TPHg = Total Petroleum Hydrocarbons as Gasoline (RL = 0.05 mg/L)
B = Benzene (RL = 0.5 ug/L)
T = Toluene (RL = 0.5 ug/L)
E = Ethyl Benzene (RL = 0.5 ug/L)
m/p-X = meta/para-Xylenes (RL = 0.5 ug/L)
o-X = ortho-Xylene (RL = 0.5 ug/L)
DIPE = Di-isopropyl Ether (RL = 1 ug/L)
ETBE = Ethyl Tertiary Butyl Ether (RL = 1 ug/L)
TAME = Tertiary Amyl Methyl Ether (RL = 1 ug/L)
TBA = Tertiary Butyl Alcohol (RL = 10 ug/L)

Site #065

Summary of Chemical Analysis Results for Groundwater Samples

Santa Clara Valley Water District

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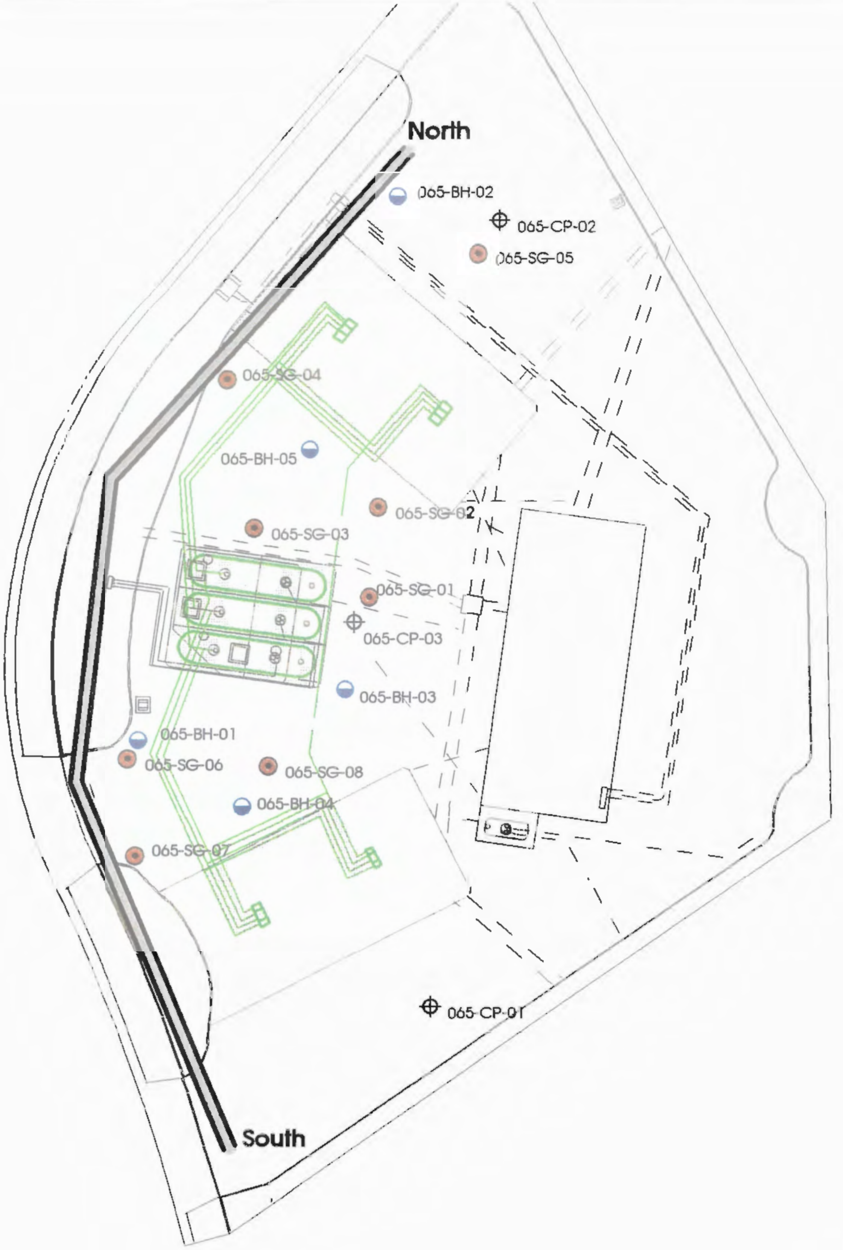
Figure 5



Legend

🟩 Gasoline underground storage tank, product and return piping, and dispenser

○ UST access port

☐ Concrete slab

– – – Underground utilities

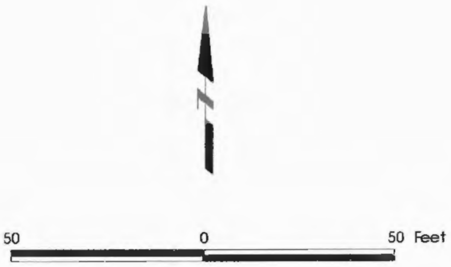
▤ Storm Drain Catch Basin

◒ Soil and groundwater sampling point

● Soil-gas sampling point

⌖ Cone-penetrometer test point

See Figure 2 for description of site features and origin of base map.



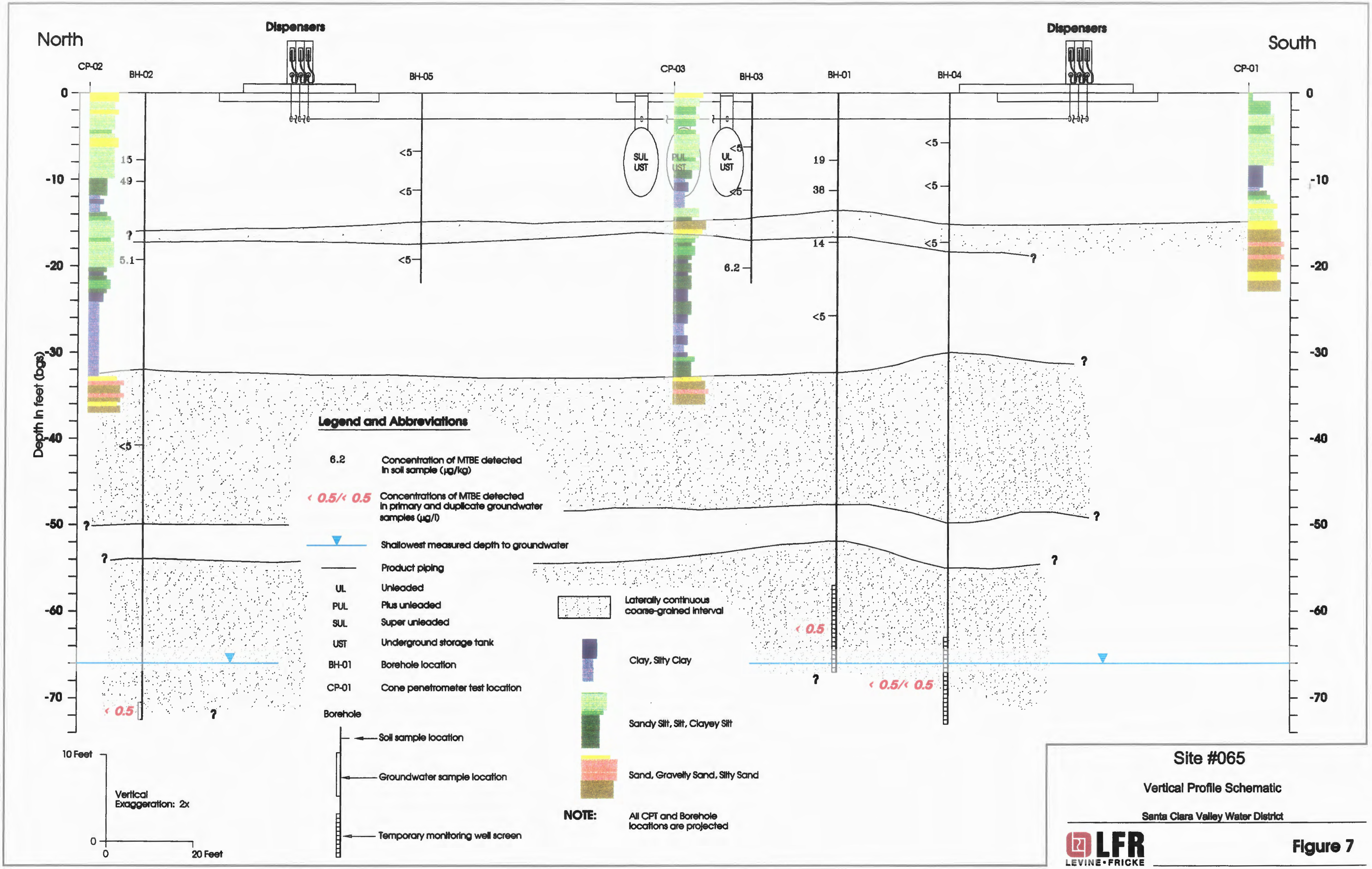
Site #065

Site Plan Showing Orientation of Vertical Profile

Santa Clara Valley Water District

LFR
LEVINE•FRICKE

Figure 6


North
South
Dispensers
Dispensers
CP-02
BH-02
BH-05
CP-03
BH-03
BH-01
BH-04
CP-01
SUL UST
PUL UST
UL UST
Depth in feet (bgs)
0
-10
-20
-30
-40
-50
-60
-70
15
49
5.1
<5
6.2
19
38
14
?
‹ 0.5
‹ 0.5/‹ 0.5
Legend and Abbreviations
6.2 Concentration of MTBE detected in soil sample (µg/kg)
‹ 0.5/‹ 0.5 Concentrations of MTBE detected in primary and duplicate groundwater samples (µg/l)
Shallowest measured depth to groundwater
Product piping
UL Unleaded
PUL Plus unleaded
SUL Super unleaded
UST Underground storage tank
BH-01 Borehole location
CP-01 Cone penetrometer test location
Borehole
Soil sample location
Groundwater sample location
Temporary monitoring well screen
Laterally continuous coarse-grained interval
Clay, Silty Clay
Sandy Silt, Silt, Clayey Silt
Sand, Gravelly Sand, Silty Sand
NOTE: All CPT and Borehole locations are projected
10 Feet
0
20 Feet
Vertical Exaggeration: 2x

Site #065

Vertical Profile Schematic

Santa Clara Valley Water District

LFR LEVINE·FRICKE

Figure 7

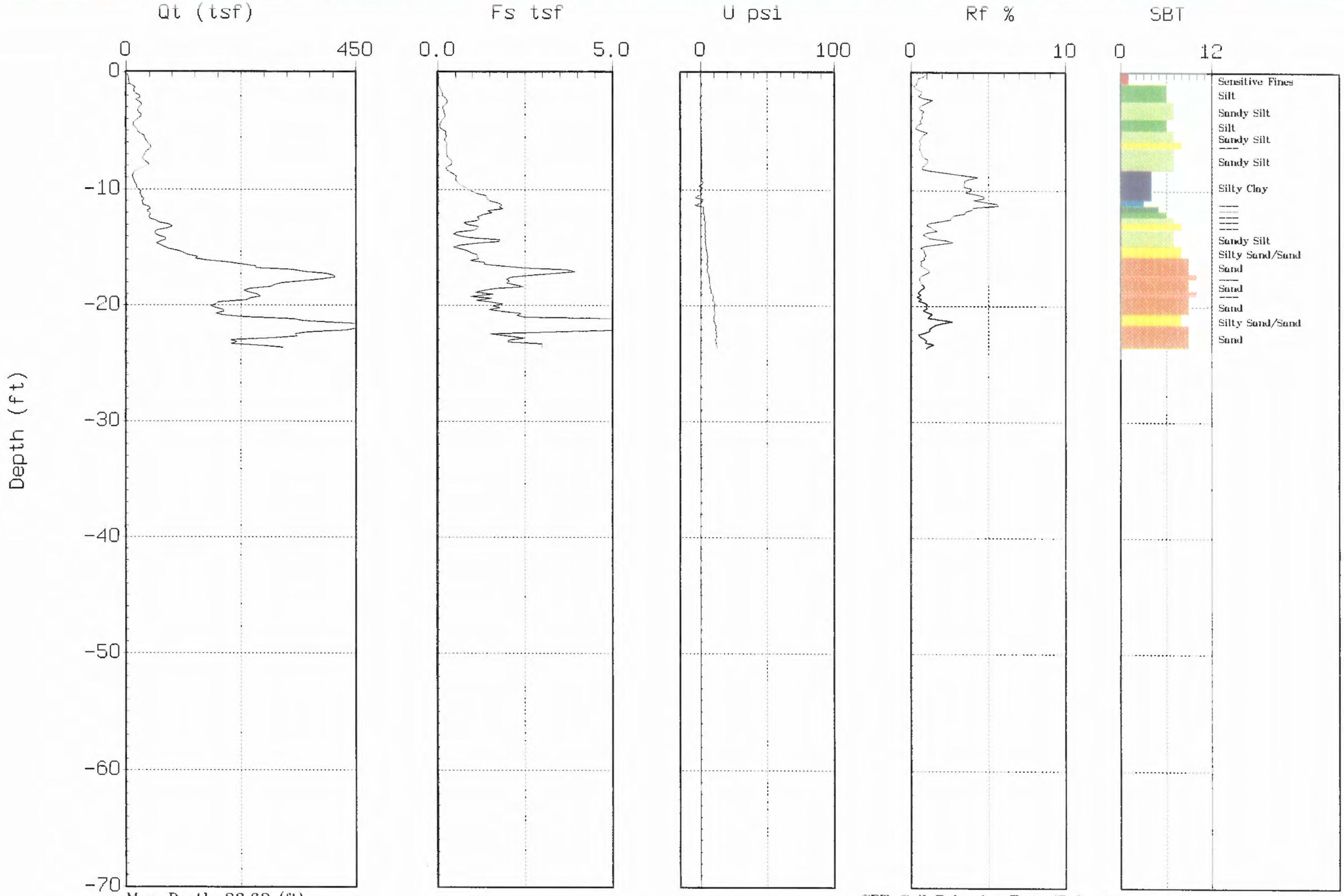
J:\ENGCAD\6730\CM#065.DWG 03/11/99 CM#505.PCP

GREGG

LFR LEVINE.FRICKE

Site: #065
Location : 065-CP-01

Geologist: Todd Miller
Date : 11:05:98 10:25



Max. Depth: 23.62 (ft)

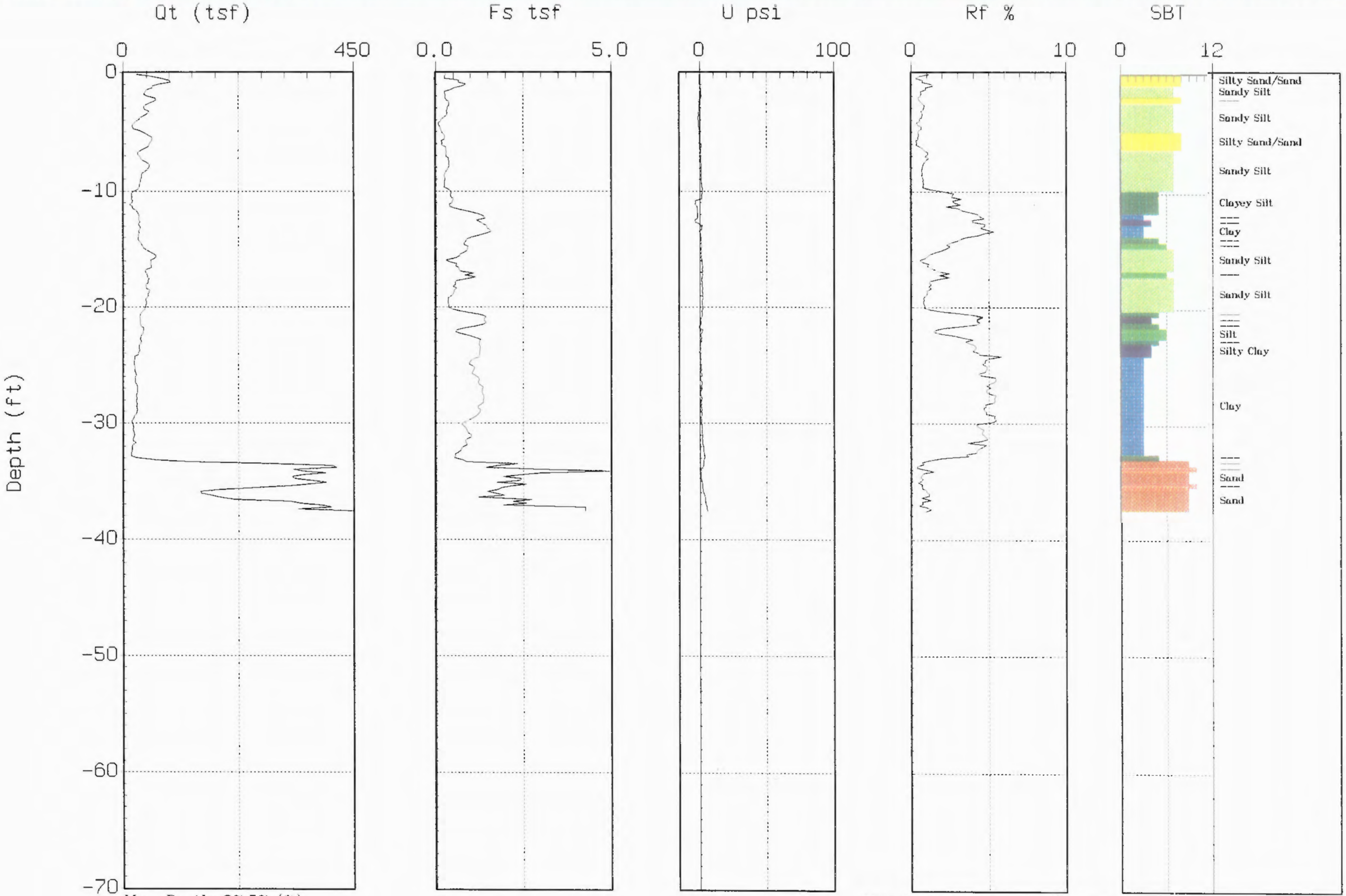
Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson and Campanella 1988)

LFR LEVINE.FRICKE

Site: 065
Location : 065-CP-02

Geologist: Todd Miller
Date : 11:05:98 11:19



Max. Depth: 37.57 (ft)

Depth Inc.: 0.164 (ft)

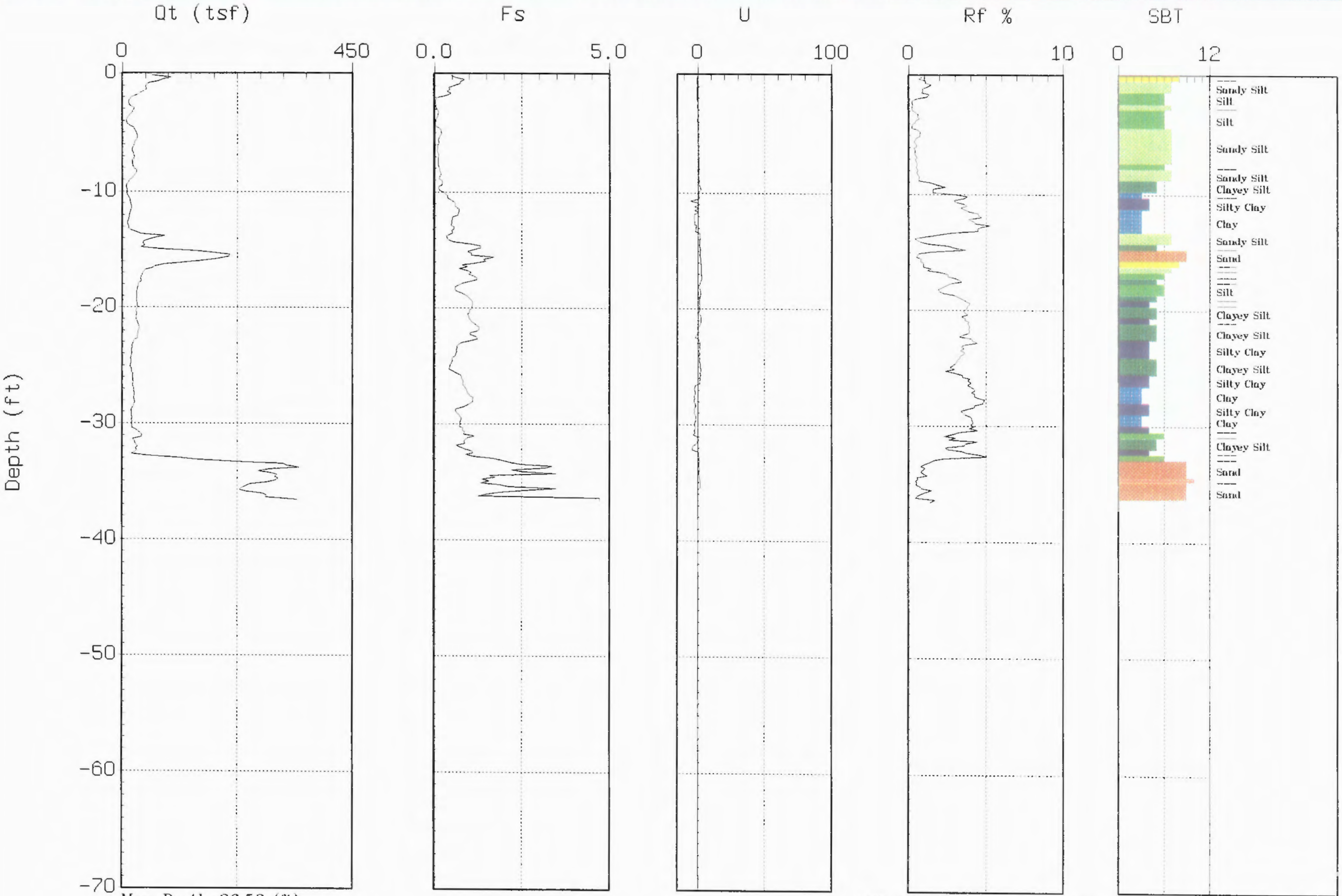
SBT: Soil Behavior Type (Robertson and Campanella 1988)

GREGG

LFR LEVINE.FRICKE

Site: #065
Location : 065-CP-03

Geologist: Todd Miller
Date : 11:05:98 12:30



Max. Depth: 36.58 (ft)

Depth Inc.: 0.164 (ft)

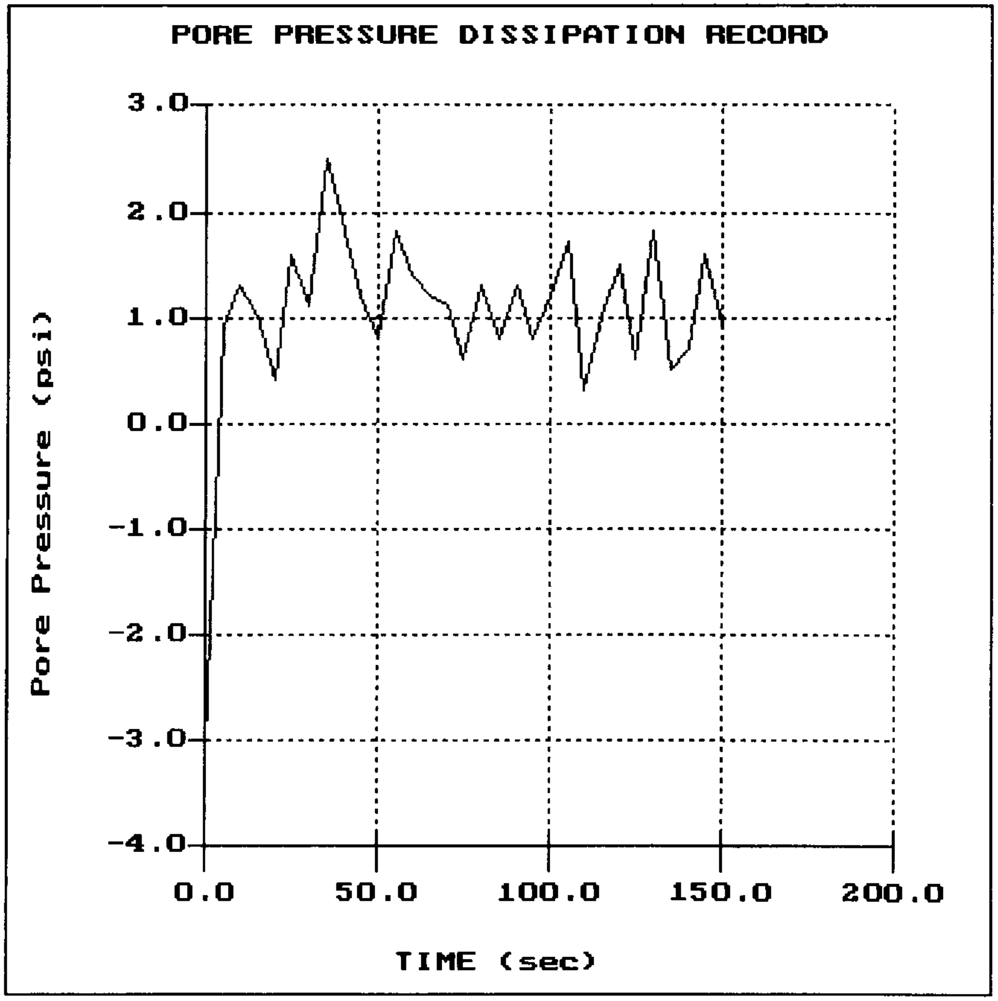
SBT: Soil Behavior Type (Robertson and Campanella 1988)

LFR LEVINE FRICKE

Hole:065-CP-02
Location:#065

Cone:20 TON AD071
Date:11:05:98 11:19

File: 108C16.PPR
Depth (m): 3.85
(ft): 12.63
Duration : 150.0s



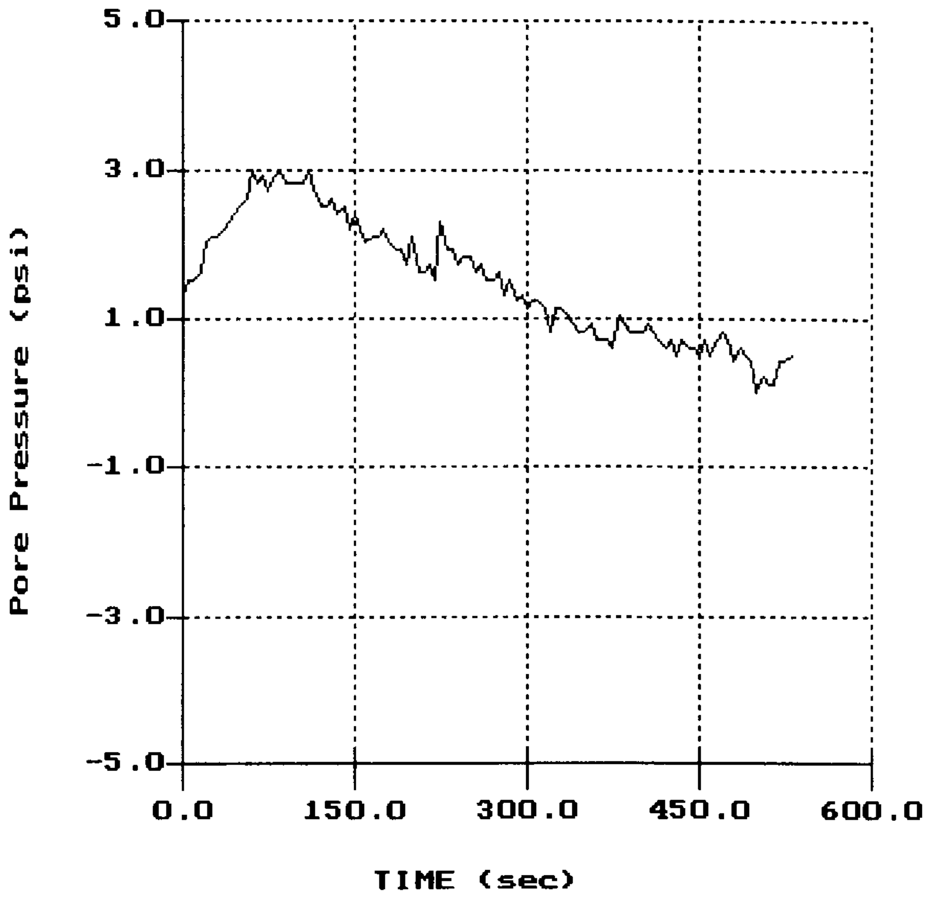
LFR LEVINE FRICKE

Hole:065-CP-02
Location:#065

Cone:20 TON AD071
Date:11:05:98 11:19

File: 108C16.PPR
Depth (m): 10.50
(ft): 34.45
Duration : 530.0s

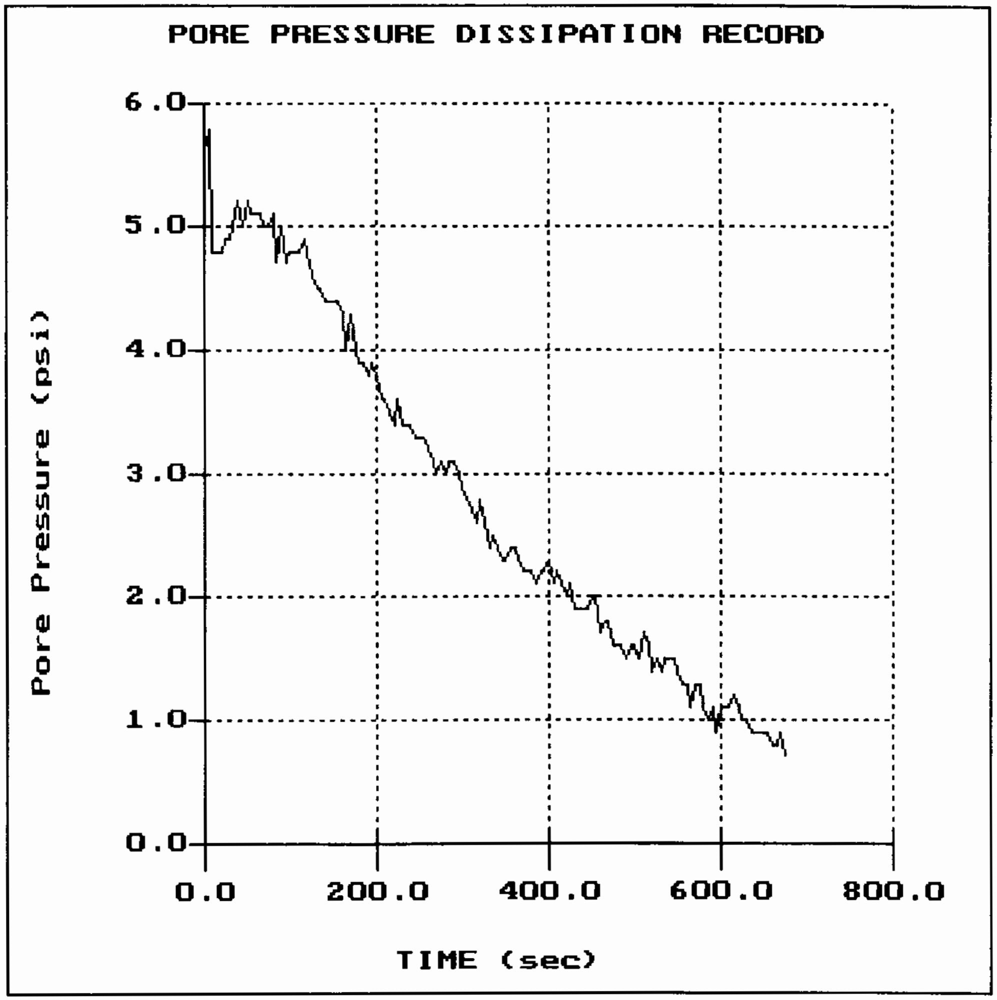
PORE PRESSURE DISSIPATION RECORD



LFR LEVINE FRICKE

Hole:065-CP-02
Location:#065

Cone:20 TON AD071
Date:11:05:98 11:1



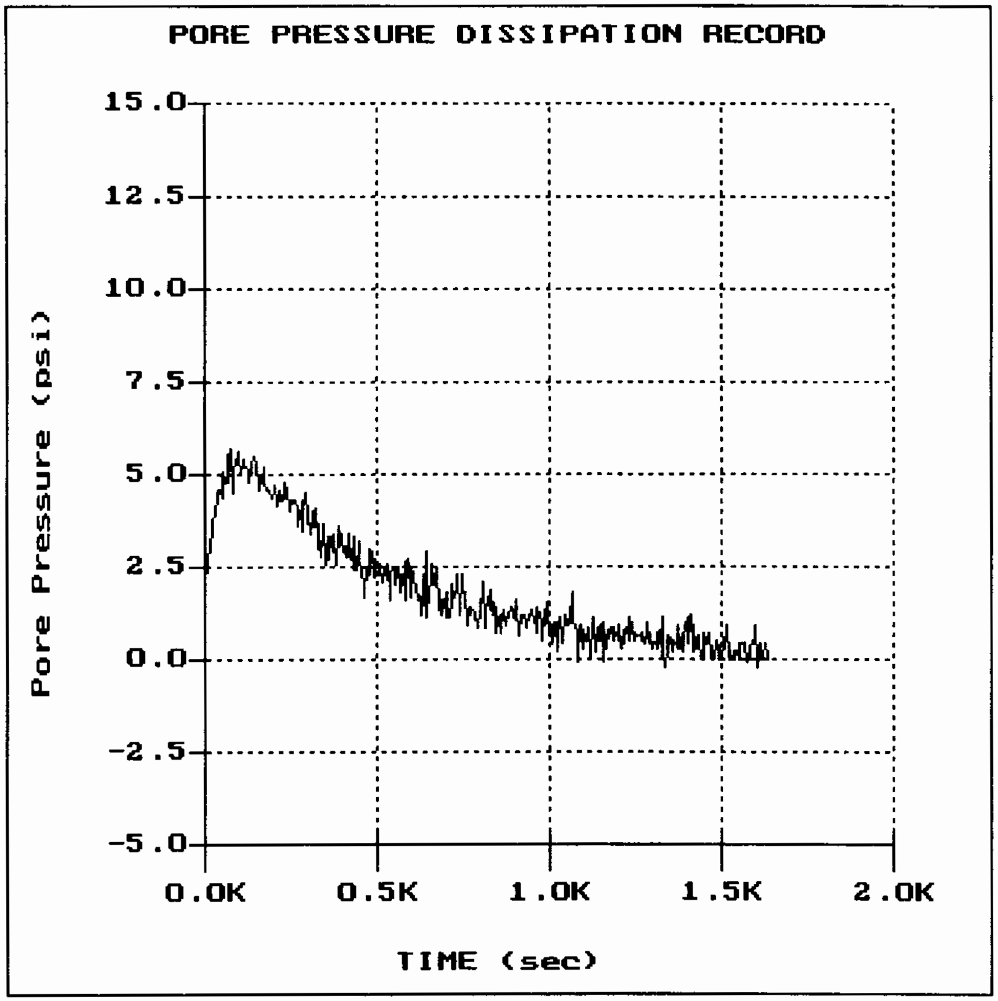
File: 108C16.PPR
Depth (m): 11.45
(ft): 37.57
Duration : 675.0s

LFR LEVINE FRICKE

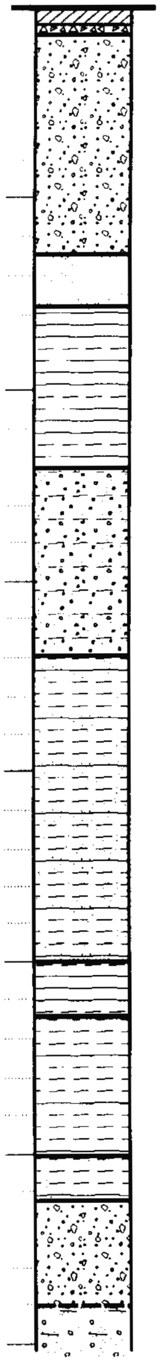
Hole:065-CP-03
Location:#065

Cone:20 TON AD071
Date:11:05:98 12:30

File: 108C17.PPR
Depth (m): 10.80
(ft): 35.43
Duration : 1635.0s



SCVWD PILOT STUDY



Depth, feet	Water Level	PID Reading (ppm)	Lithologic Description
			5" thick ASPHALT. 3" thick CONCRETE.
5		0.0	GRAVEL Fill, poor recovery to less than 5 feet.
			SAND (SP), yellowish brown, moist, loose, very fine grained, trace silt.
		0.0	SILTY CLAY (CL), grayish brown, very moist, soft, high plasticity.
10			SILTY CLAY (CL), brown to yellowish brown, medium stiff, low to medium plasticity.
		0.0	SILTY SANDY GRAVEL (GM), yellowish brown, slightly moist, dense, well graded, subangular.
15		0.2	
		0.2	CLAYEY SANDY SILT (ML), yellowish brown, moist, stiff, low plasticity.
20			
		0.0	Soft, increase sand content.
25		0.0	SILTY CLAY (CL), yellowish brown, moist, stiff, high plasticity, trace gravel.
			CLAYEY SILT (ML), yellowish brown, moist, soft to medium stiff, low plasticity.
		0.0	Stiff, medium plasticity.
30			CLAYEY SANDY SILT (ML), yellowish brown, moist, medium stiff, low plasticity.
			GRAVEL (GW), light gray to dark brownish gray, dry, hard, highly cemented sand or friable sandstone cobbles with subrounded gravel, well graded.
35			SILTY GRAVELLY SAND (SM), mottled colored dark grayish brown, moist, hard, cemented, friable, well graded.

Sample Interval

cont....

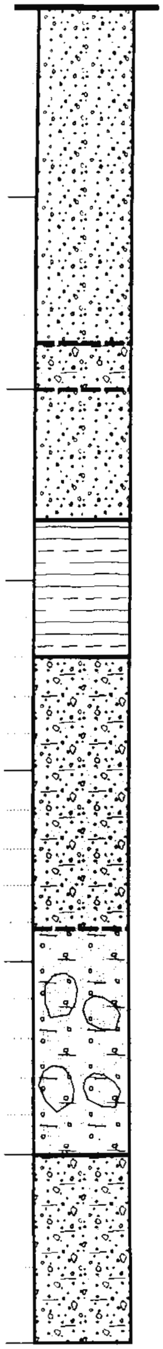
Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: December 4, 1998
LFR Geologist: Todd Miller, R.G., CH.G.

JENNIFER J. BEATTY
No. 6650
Exp. 4/30/01

EXPLANATION

▤	Clay
┄	Silt
░	Sand
⁘	Gravel
▯	PID - Photoionization Detector
▼	Water level at time of drilling

SCVWD PILOT STUDY



Depth, feet	Water Level	PID Reading (ppm)	Lithologic Description	Sample Interval
			SANDY GRAVEL (GW), olive-brown, slightly moist, very dense, well graded, subrounded and subangular to 4 centimeters.	
		0.0		
40				40
		0.0		
		0.0	SILTY SANDY GRAVEL (GM), grayish brown, moist, loose, well graded to more than 5 centimeters, subrounded and subangular.	
45				45
		0.0	SANDY GRAVEL (GW), grayish brown, slightly moist, very dense, well graded to cobble size, cemented, heterogenous weathered mixture of fragments.	
			SILTY CLAY (CL), yellowish brown, slightly moist, medium stiff, medium plasticity.	
50				50
		0.0		
		0.0	SILTY SANDY GRAVEL (GM), grayish brown, slightly moist, very dense, well graded, subangular, heterogenous cemented mixture as above.	
55			SILTY SANDY GRAVEL (GM), olive-brown, very moist, dense, non cemented, well graded, subrounded to 2 centimeters.	55
		0.0		
			Cobbles, dry.	
		0.0	SILTY GRAVELLY SAND (SM), grayish brown, moist, dense, well graded, subround.	
60				60
			Cobbles.	
		0.0	SILTY GRAVELLY SAND (SM), olive-brown, very moist, very dense, coarse-grained sand, well graded to 4 centimeters.	
65			Wet. SILTY GRAVEL (GM), brownish gray, slightly moist, very dense, well graded, angular, clasts to 4 centimeters.	65
70			BOTTOM OF BORING AT 70 FEET.	70

Drilling Method:	Dual-Tube/Direct Push
Drilling Company:	Precision
Date Well Drilled:	December 4, 1998
LFR Geologist:	Todd Miller, R.G., CH.G.

No. 6650
Exp. 4/30/01

EXPLANATION

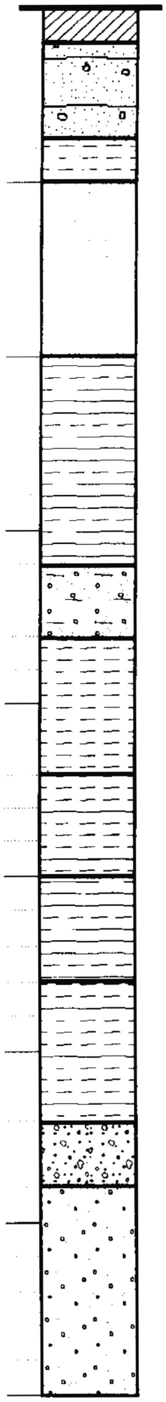
☰	Clay
☰	Silt
▨	Sand
▨	Gravel
▯	PID - Photoionization Detector
▼	Water level at time of drilling

LFR
LEVINE•FRICKE

LITHOLOGY FOR 065-BH-01 *(page 2 of 2)*

Project No. 6730.00-024

SCVWD PILOT STUDY



Depth, feet	Water Level	PID Reading (ppm)	Lithologic Description	Sample Interval
			ASPHALT surface approximately 1 foot.	
			Clayey soil.	
5		0.0	SANDY SILT (ML), dark brown, slightly moist, stiff, low plasticity.	5
			SAND (SP), dark yellowish brown, slightly moist, loose, fine grained.	
		0.0	Coarse sand.	
10			SILTY CLAY (CL), moist, soft, low plasticity.	10
		0.0		
			Dark yellowish brown, medium stiff, medium to high plasticity.	
15		0.0		15
			SILTY GRAVELLY SAND (SM), yellowish brown, moist, dense, well graded, subrounded, gravel to 2 centimeters.	
		0.0	SANDY SILT (ML), yellowish brown, slightly moist, stiff, low plasticity.	
20		0.0		20
			CLAYEY SILT (ML), yellowish brown, moist, medium stiff, low plasticity.	
		0.0		
25			SILTY CLAY (CL), yellowish brown, slightly moist, stiff, medium plasticity.	25
		0.0		
			CLAYEY SILT (ML), yellowish brown, slightly moist, soft, low plasticity.	
30				30
		0.0	SANDY GRAVEL (GP), grayish brown, slightly moist, hard, angular to 2 to 3 centimeters in matrix of fine- to medium-grained sand.	
35			GRAVELLY SAND (SW) to SANDY GRAVEL (GW), grayish brown, moist, dense to very dense, fine to medium sand, subangular and subronded gravel to 5 centimeters, well graded.	35
		0.0		
		0.0		
40				40

Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: December 7, 1998
LFR Geologist: Todd Miller, R.G., CH.G.

REGISTERED GEOLOGIST
JENNIFER J. BEATTY
No. 6650
Exp. 1/31/01
STATE OF CALIFORNIA

EXPLANATION

▤	Clay
☷	Silt
░	Sand
▨	Gravel

PID - Photoionization Detector

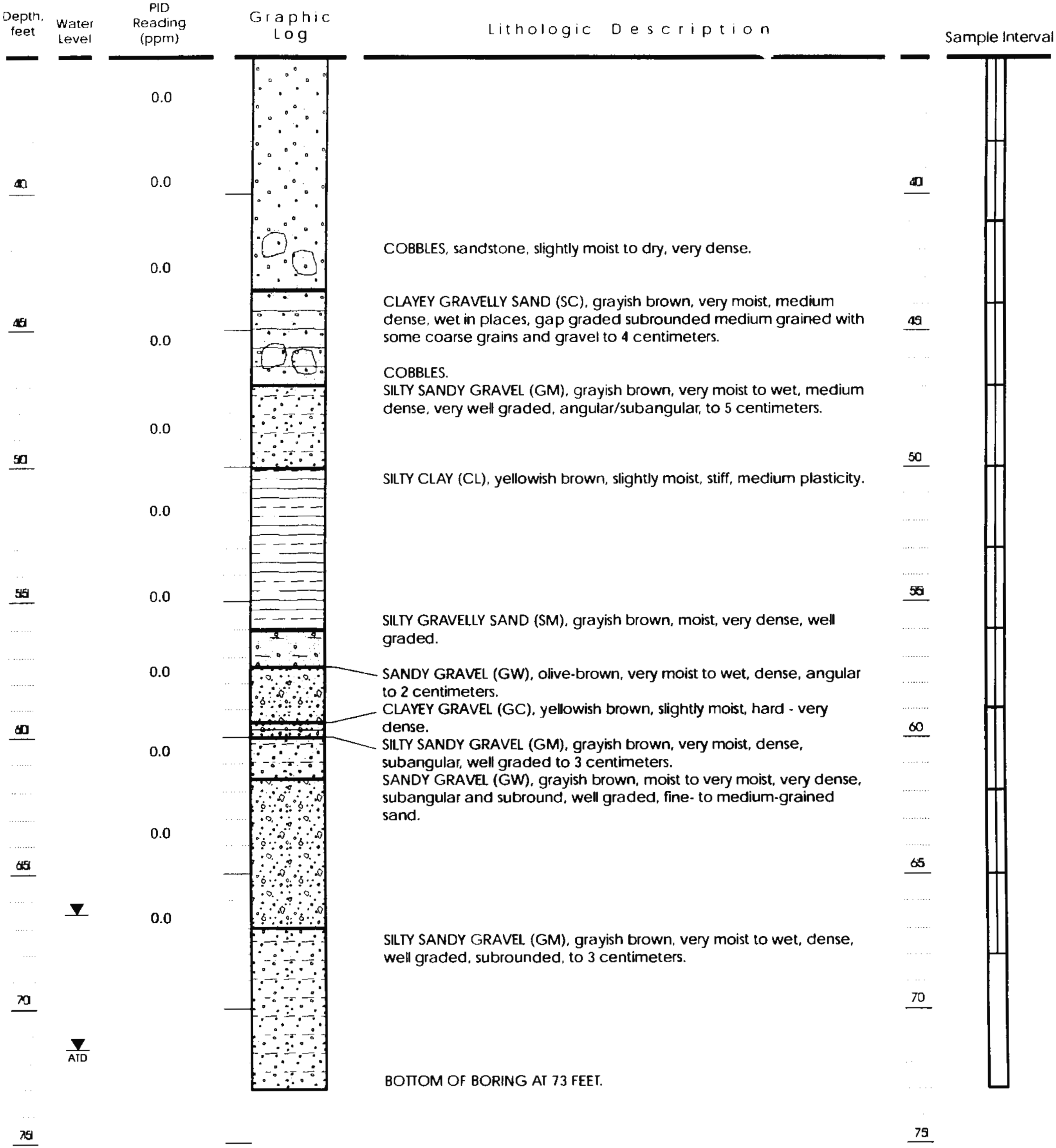
▼ Water level at time of drilling

LFR
LEVINE•FRICKE

LITHOLOGY FOR 065-BH-02 *(page 1 of 2)*

Project No. 6730.00-030

SCVWD PILOT STUDY



COBBLES, sandstone, slightly moist to dry, very dense.

CLAYEY GRAVELLY SAND (SC), grayish brown, very moist, medium dense, wet in places, gap graded subrounded medium grained with some coarse grains and gravel to 4 centimeters.

COBBLES.

SILTY SANDY GRAVEL (GM), grayish brown, very moist to wet, medium dense, very well graded, angular/subangular, to 5 centimeters.

SILTY CLAY (CL), yellowish brown, slightly moist, stiff, medium plasticity.

SILTY GRAVELLY SAND (SM), grayish brown, moist, very dense, well graded.

SANDY GRAVEL (GW), olive-brown, very moist to wet, dense, angular to 2 centimeters.

CLAYEY GRAVEL (GC), yellowish brown, slightly moist, hard - very dense.

SILTY SANDY GRAVEL (GM), grayish brown, very moist, dense, subangular, well graded to 3 centimeters.

SANDY GRAVEL (GW), grayish brown, moist to very moist, very dense, subangular and subround, well graded, fine- to medium-grained sand.

SILTY SANDY GRAVEL (GM), grayish brown, very moist to wet, dense, well graded, subrounded, to 3 centimeters.

BOTTOM OF BORING AT 73 FEET.

Drilling Method:	Dual-Tube/Direct Push
Drilling Company:	Precision
Date Well Drilled:	December 7, 1998
LFR Geologist:	Todd Miller, R.G., CH.G.

No. 6650
Exp. 4/30/00

EXPLANATION

☰	Clay
▭	Silt
▨	Sand
▨	Gravel

PID - Photoionization Detector

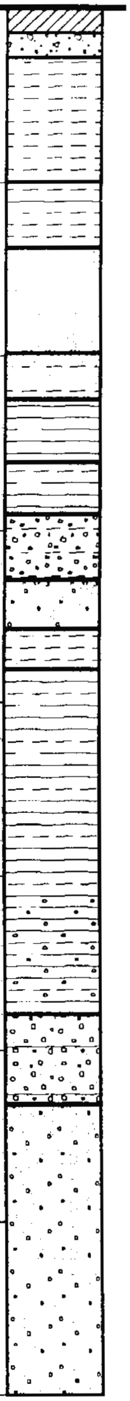
▼ Water level at time of drilling

LFR
LEVINE•FRICKE

LITHOLOGY FOR 065-BH-02 *(page 2 of 2)*

Project No. 6730.00-030

SCVWD PILOT STUDY



Depth, feet	Water Level	PID Reading (ppm)	Lithologic Description	Sample Interval
			ASPHALT surface approximately 10", base GRAVEL.	
			Silty soil.	
5		0.0	CLAYEY SILT (ML), brown, slightly moist, medium stiff, low plasticity.	5
			SAND (SP), dark yellowish brown, slightly moist, fine grained, loose.	
		0.0		
10			SILTY SAND (SM), dark yellowish brown, slightly moist, medium dense, very fine grained. CLAY (CL), brown, slightly moist, medium stiff, high plasticity.	10
		0.0		
			SILTY CLAY (CL), yellowish brown, slightly moist, very stiff, low plasticity.	
15		0.0	SILTY GRAVEL (GM), yellowish brown, moist, loose, well graded, angular and subrounded.	15
		0.0	GRAVELLY SAND (SP), yellowish brown, moist, very loose, fine-grained sand, subangular gravel to 1.5 centimeters. CLAYEY SANDY SILT (ML), yellowish brown, slightly moist, stiff, low plasticity, some gravel.	
20			SILTY CLAY (CL), yellowish brown, slightly moist, stiff, low plasticity.	20
		0.0		
		0.0		
25			Occasional weathered gravel and coarse sand.	25
		0.0		
			Softer, more gravel.	
30			CLAYEY SANDY GRAVEL (GC), yellowish brown, moist, medium dense, subangular to 2 centimeters.	30
		0.0	GRAVELLY SAND (SW), brownish yellow, slightly moist, loose to medium dense, well graded, subrounded, angular gravel (fractured cobbles?).	
35				35
		0.0		
		0.0		
40				40

Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: December 8, 1998
LFR Geologist: Todd Miller, R.G., CH.G.

JENNIFER J. BEATTY
No. 6650
Exp. 4/30/01

EXPLANATION

▤	Clay
☷	Silt
░	Sand
⁘	Gravel

PID - Photoionization Detector

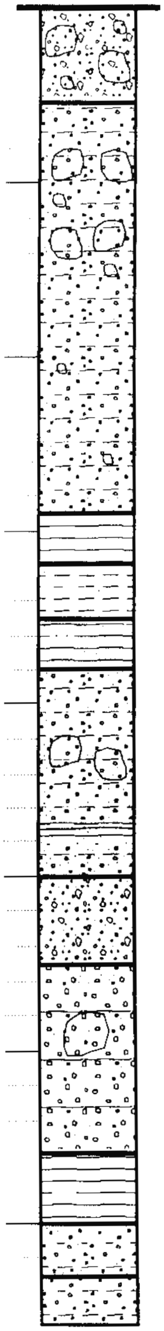
▼ Water level at time of drilling

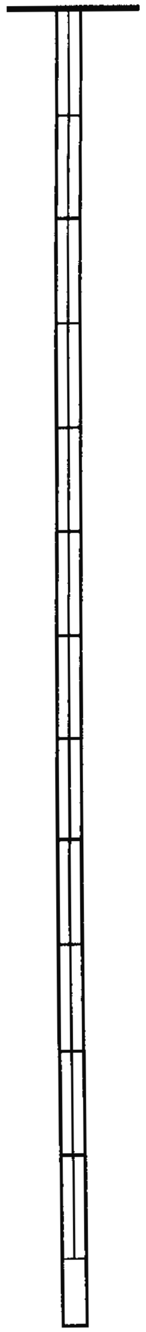
LFR
LEVINE·FRICKE

LITHOLOGY FOR 065-BH-04 *(page 1 of 2)*

Project No. 6730.00-030

SCVWD PILOT STUDY





Depth, feet	Water Level	PID Reading (ppm)	Lithologic Description
		0.0	SANDY GRAVEL (GW), dark yellowish brown, moist to dry, dense, well graded angular coarse sand to cobble size.
		0.0	SILTY SANDY GRAVEL (GM), grayish brown, slightly moist to moist, very dense, well graded subangular and subround.
40			
		0.0	
			SILTY SANDY GRAVEL (GM), grayish brown, very moist, dense, well graded, coarse subangular sand to angular gravel, 3 centimeters.
		0.0	
45			
			Wet.
		0.0	
50			CLAY (CL), yellowish brown, slightly moist, medium stiff, low plasticity.
		0.0	
			SANDY SILT (ML), dark yellowish brown, moist, soft.
			SANDY CLAY (CL), yellowish brown, slightly moist, soft, medium to high plasticity.
		0.0	
55			SILTY SANDY GRAVEL (GM), brownish gray, very moist, medium dense, well graded to 2 centimeters, subangular.
		0.0	
			Brownish yellow, sandstone cobble inclusions.
			SANDY CLAY (CL) interbed.
		0.0	
60			
			SANDY GRAVEL (GW), dark yellowish brown, very moist, medium dense, subangular to 1.5 centimeters.
		0.0	
			CLAYEY SANDY GRAVEL (GC), grayish brown, moist to very moist, well graded subrounded coarse sand and gravel to 4 centimeters, very dense..
65			
		0.0	
			Very wet.
			CLAY (CL), yellowish brown, very moist, soft, low plasticity.
70			
			SILTY SANDY GRAVEL (GM), grayish brown, wet, medium dense, well graded, coarse sand and gravel to 3 centimeters.
			CLAYEY GRAVELLY SILT (ML), yellowish brown, very moist, very soft, low plasticity.
			BOTTOM OF BORING AT 73 FEET.
75			

Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: December 8, 1998
LFR Geologist: Todd Miller, R.G., CH.G.

J. BEATTY
No. 6650
Exp. 4/30/01

EXPLANATION

▤	Clay
☰	Silt
░	Sand
▒	Gravel

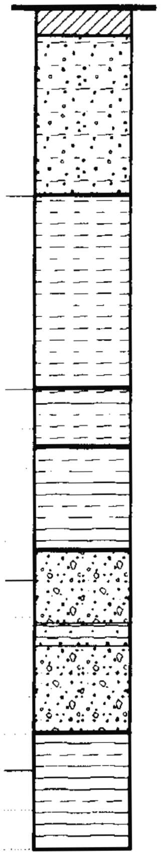
PID - Photoionization Detector

▼ Water level at time of drilling

SCVWD PILOT STUDY

Depth, feet	Water Level	PID Reading (ppm)	Lithologic Description
			ASPHALT surface approximately 10" thick.
			Silty soil.
5		0.0	SANDY SILT (ML), dark yellowish brown, slightly moist, very soft, low plasticity.
		0.0	Moist.
10			CLAYEY SILT (ML), dark yellowish brown, moist, very soft, low plasticity.
		0.0	SILTY CLAY (CL), dark yellowish brown to grayish brown, slightly moist, very stiff, medium to high plasticity.
		0.0	
15			SANDY GRAVEL (GW), brownish yellow, moist, loose, rounded to 2 centimeters.
		0.0	Interlayered sandy gravel and gravelly clay.
20			SILTY CLAY (CL), yellowish brown, slightly moist, medium stiff, low plasticity.
			BOTTOM OF BORING AT 22 FEET.
25			
30			
35			

Graphic Log



Sample Interval

J. BEATTY
NO. 6650

Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: December 8, 1998
LFR Geologist: Todd Miller, R.G., CH.G.

EXPLANATION

▤	Clay
▤	Silt
░	Sand
▨	Gravel

PID - Photoionization Detector

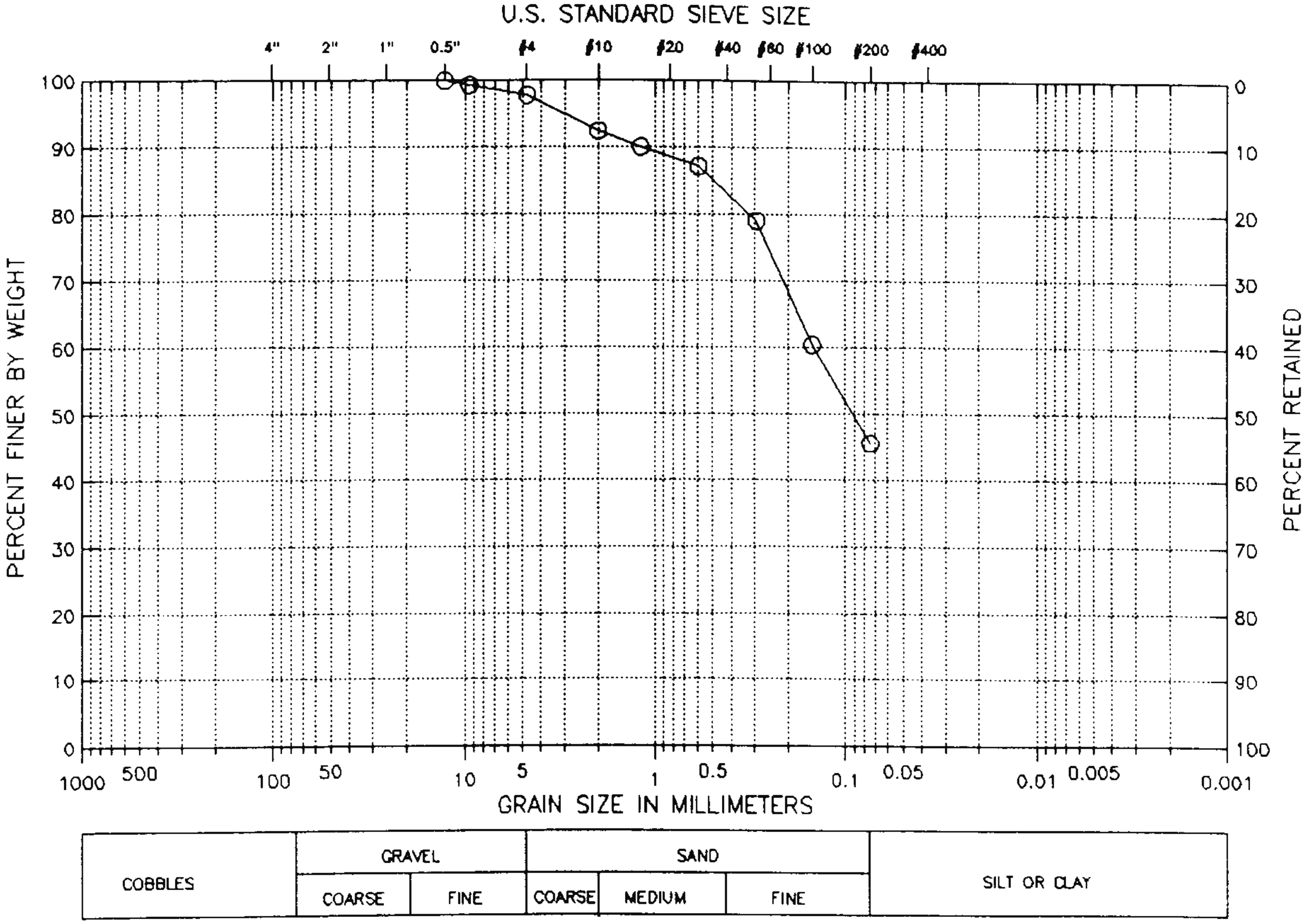
▼ Water level at time of drilling

LITHOLOGY FOR 065-BH-05 *(page 1 of 1)*

LFR LEVINE•FRICKE

Project No. 6730.00-024

	Boring No. : 065-BH-01 Sample No.: 13.0-13.5 SV Tested by : C. WASON Filename : 065-13	Project : LEVINE FRICKE RECON 6730.00-024 Project No.: 16148A Location: SCVWD MTBE Date : Wed Dec 16 1998



Classification :

Remarks :
Depth: 13.0-13.5 feet

Visual Description :
BROWN CLAYEY SILTY SAND

Figure 1

URS Greiner Woodward Clyde

Wed Dec 16 09:56:16 1998

GEOTECHNICAL LABORATORY TEST DATA

Project : LEVINE FRICKE RECON 6730.00-024
Filename : 065-13
Project No. : 16148A
Depth : 13.0-13.5 FT.
Elevation : NA
Boring No. : 065-BH-01
Test Date : 12/16/98
Tested by : C. WASON
Sample No. : 13.0-13.5 SV
Test Method : ASTM D422
Checked by : S. CAPPS
Location : SCVWD MTBE
Soil Description : BROWN CLAYEY SILTY SAND
Remarks : Depth: 13.0-13.5 feet

COARSE SIEVE SET

Sieve Mesh	Sieve Openings Inches	Millimeters	Weight Retained (gm)	Cumulative Weight Retained (gm)	Percent Finer (%)
0.5"	0.500	12.70	0.00	0.00	100
0.375"	0.374	9.51	1.29	1.29	99
#4	0.187	4.75	2.99	4.28	98
#10	0.079	2.00	10.43	14.71	92
#16	0.047	1.19	4.52	19.23	90
#30	0.023	0.60	5.60	24.83	87
#50	0.012	0.30	15.82	40.65	79
#100	0.006	0.15	36.31	76.96	60
#200	0.003	0.07	28.61	105.57	46

Total Dry Weight of Sample = 194.24

D85 : 0.4916 mm
D60 : 0.1463 mm
D50 : 0.0910 mm
D30 : N/A
D15 : N/A
D10 : N/A

Soil Classification
ASTM Group Symbol : N/A
ASTM Group Name : N/A
AASHTO Group Symbol : A-4(0)
AASHTO Group Name : Silty Soils

```
Wed Dec 16 09:56:16 1998                                                                    Page :  2

                                   GEOTECHNICAL LABORATORY TEST DATA

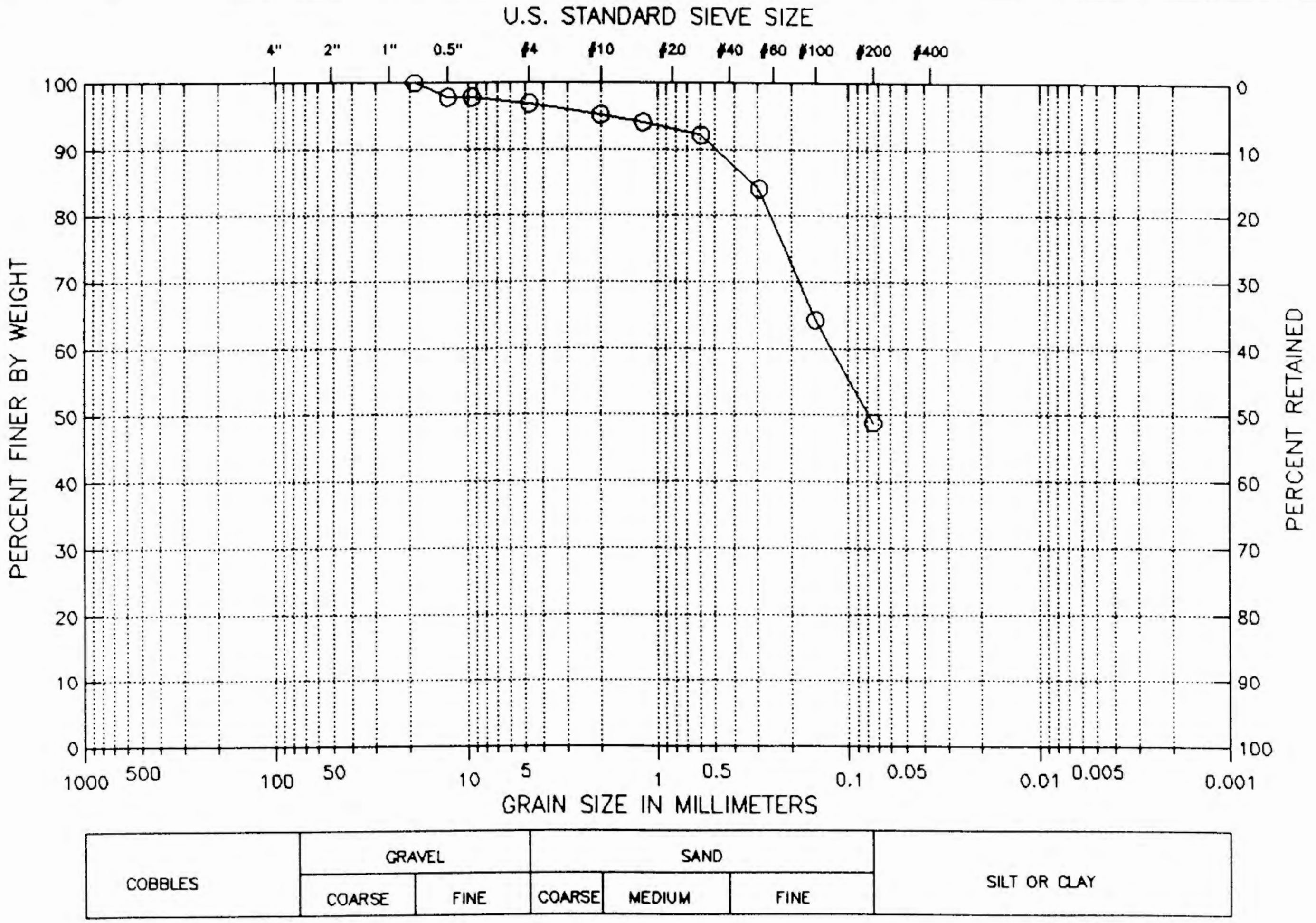
Project : LEVINE FRICKE RECON  6730.00-024                            Filename : 065-13
Project No. : 16148A            Depth : 13.0-13.5 FT.                 Elevation : NA
Boring No. : 065-BH-01          Test Date : 12/16/98                  Tested by : C. WASON
Sample No. : 13.0-13.5 SV       Test Method : ASTM D422               Checked by : S. CAPPS
Location : SCVWD  MTBE
Soil Description : BROWN CLAYEY SILTY SAND
Remarks : Depth: 13.0-13.5 feet

                                      Natural Moisture Content
   Moisture Content    Mass of Container   Mass of Container   Mass of Container   Moisture Content
   ID                                      and Moist Soil      and Dried Soil
                             (gm)                (gm)                (gm)                (%)
   -----------------   -----------------   -----------------   -----------------   -----------------
1) 65-01-13                       223.36              445.30              417.60               14.26

     Average Moisture Content = 14.26
```

Boring No. : 065-BH-01
Sample No.: 23.0-23.5 SV
Tested by : C. WASON
Filename : 065-23

Project : LEVINE FRICKE RECON 6730.00-024
Project No.: 16148A
Location: SCVWD MTBE
Date : Wed Dec 16 1998



Classification :

Visual Description :
BROWN SA-SI CLAY TO CLAYEY SI-SAND W/ FINE GRAVEL

Remarks :
Depth: 23.0-23.5 feet

Figure 1

URS Greiner Woodward Clyde

Wed Dec 16 10:15:41 1998

GEOTECHNICAL LABORATORY TEST DATA

Project : LEVINE FRICKE RECON 6730.00-024
Filename : 065-23
Project No. : 16148A
Depth : 23.0-23.5 FT.
Elevation : NA
Boring No. : 065-BH-01
Test Date : 12/16/98
Tested by : C. WASON
Sample No. : 23.0-23.5 SV
Test Method : ASTM D422
Checked by : S. CAPPS
Location : SCVWD MTBE
Soil Description : BROWN SA-SI CLAY TO CLAYEY SI-SAND W/ FINE GRAVEL
Remarks : Depth: 23.0-23.5 feet

COARSE SIEVE SET

Sieve Mesh	Sieve Openings Inches	Sieve Openings Millimeters	Weight Retained (gm)	Cumulative Weight Retained (gm)	Percent Finer (%)
0.75"	0.748	19.00	0.00	0.00	100
0.5"	0.500	12.70	4.90	4.90	98
0.375"	0.374	9.51	0.00	4.90	98
#4	0.187	4.75	2.02	6.92	97
#10	0.079	2.00	3.84	10.76	95
#16	0.047	1.19	2.41	13.17	94
#30	0.023	0.60	4.45	17.62	92
#50	0.012	0.30	18.38	36.00	84
#100	0.006	0.15	44.91	80.91	64
#200	0.003	0.07	35.14	116.05	49

Total Dry Weight of Sample = 226.78

D85 : 0.3182 mm
D60 : 0.1226 mm
D50 : 0.0780 mm
D30 : N/A
D15 : N/A
D10 : N/A

Soil Classification
ASTM Group Symbol : N/A
ASTM Group Name : N/A
AASHTO Group Symbol : A-4(0)
AASHTO Group Name : Silty Soils

GEOTECHNICAL LABORATORY TEST DATA

Project : LEVINE FRICKE RECON 6730.00-024
Filename : 065-23
Project No. : 16148A
Depth : 23.0-23.5 FT.
Elevation : NA
Boring No. : 065-BH-01
Test Date : 12/16/98
Tested by : C. WASON
Sample No. : 23.0-23.5 SV
Test Method : ASTM D422
Checked by : S. CAPPS
Location : SCVWD MTBE
Soil Description : BROWN SA-SI CLAY TO CLAYEY SI-SAND W/ FINE GRAVEL
Remarks : Depth: 23.0-23.5 feet

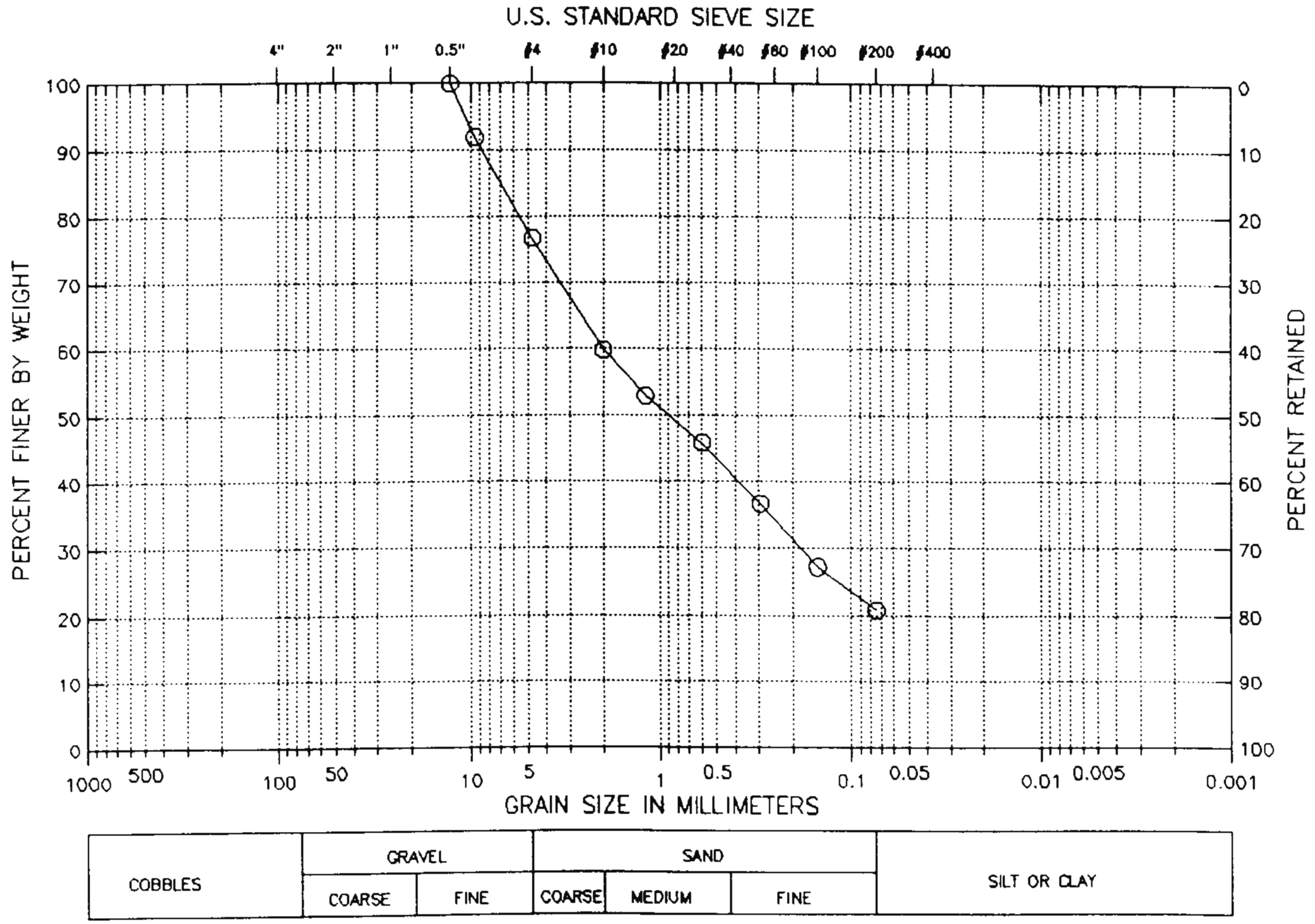
Natural Moisture Content

Moisture Content ID	Mass of Container (gm)	Mass of Container and Moist Soil (gm)	Mass of Container and Dried Soil (gm)	Moisture Content (%)
1) 65-01-23	219.02	489.20	445.80	19.14

Average Moisture Content = 19.14

Boring No. : 065–BH–01
Sample No.: 34.5–35.0 SV
Tested by : C. WASON
Filename : 065–34

Project : LEVINE FRICKE RECON 6730.00–024
Project No.: 16148A
Location: SCVWD MTBE
Date : Wed Dec 16 1998



Classification :

Remarks :
Depth: 34.5–35.0 feet

Visual Description :
GRAY BROWN CLAYEY SILTY SAND WITH FINE GRAVEL

Figure 1

URS Greiner Woodward Clyde

GEOTECHNICAL LABORATORY TEST DATA

Project : LEVINE FRICKE RECON 6730.00-024		Filename : 065-34
Project No. : 16148A	Depth : 34.5-35.0 FT.	Elevation : NA
Boring No. : 065-BH-01	Test Date : 12/16/98	Tested by : C. WASON
Sample No. : 34.5-35.0 SV	Test Method : ASTM D422	Checked by : S. CAPPS

Location : SCVWD MTBE

Soil Description : GRAY BROWN CLAYEY SILTY SAND WITH FINE GRAVEL

Remarks : Depth: 34.5-35.0 feet

COARSE SIEVE SET

Sieve Mesh	Sieve Openings Inches	Sieve Openings Millimeters	Weight Retained (gm)	Cumulative Weight Retained (gm)	Percent Finer (%)
0.5"	0.500	12.70	0.00	0.00	100
0.375"	0.374	9.51	11.26	11.26	92
#4	0.187	4.75	21.40	32.66	77
#10	0.079	2.00	23.97	56.63	60
#16	0.047	1.19	9.65	66.28	53
#30	0.023	0.60	9.94	76.22	46
#50	0.012	0.30	13.01	89.23	37
#100	0.006	0.15	13.25	102.48	27
#200	0.003	0.07	8.96	111.[illegible]4	21

Total Dry Weight of Sample = 140.82

D85 : 6.9060 mm
D60 : 2.0219 mm
D50 : 0.8922 mm
D30 : 0.1822 mm
D15 : N/A
D10 : N/A

Soil Classification

ASTM Group Symbol : N/A
ASTM Group Name : N/A
AASHTO Group Symbol : A-1-b(0)
AASHTO Group Name : Stone Fragments, Gravel and Sand

GEOTECHNICAL LABORATORY TEST DATA

Project : LEVINE FRICKE RECON 6730.00-024		Filename : 065-34
Project No. : 16148A	Depth : 34.5-35.0 FT.	Elevation : NA
Boring No. : 065-BH-01	Test Date : 12/16/98	Tested by : C. WASON
Sample No. : 34.5-35.0 SV	Test Method : ASTM D422	Checked by : S. CAPPS

Location : SCVWD MTBE

Soil Description : GRAY BROWN CLAYEY SILTY SAND WITH FINE GRAVEL

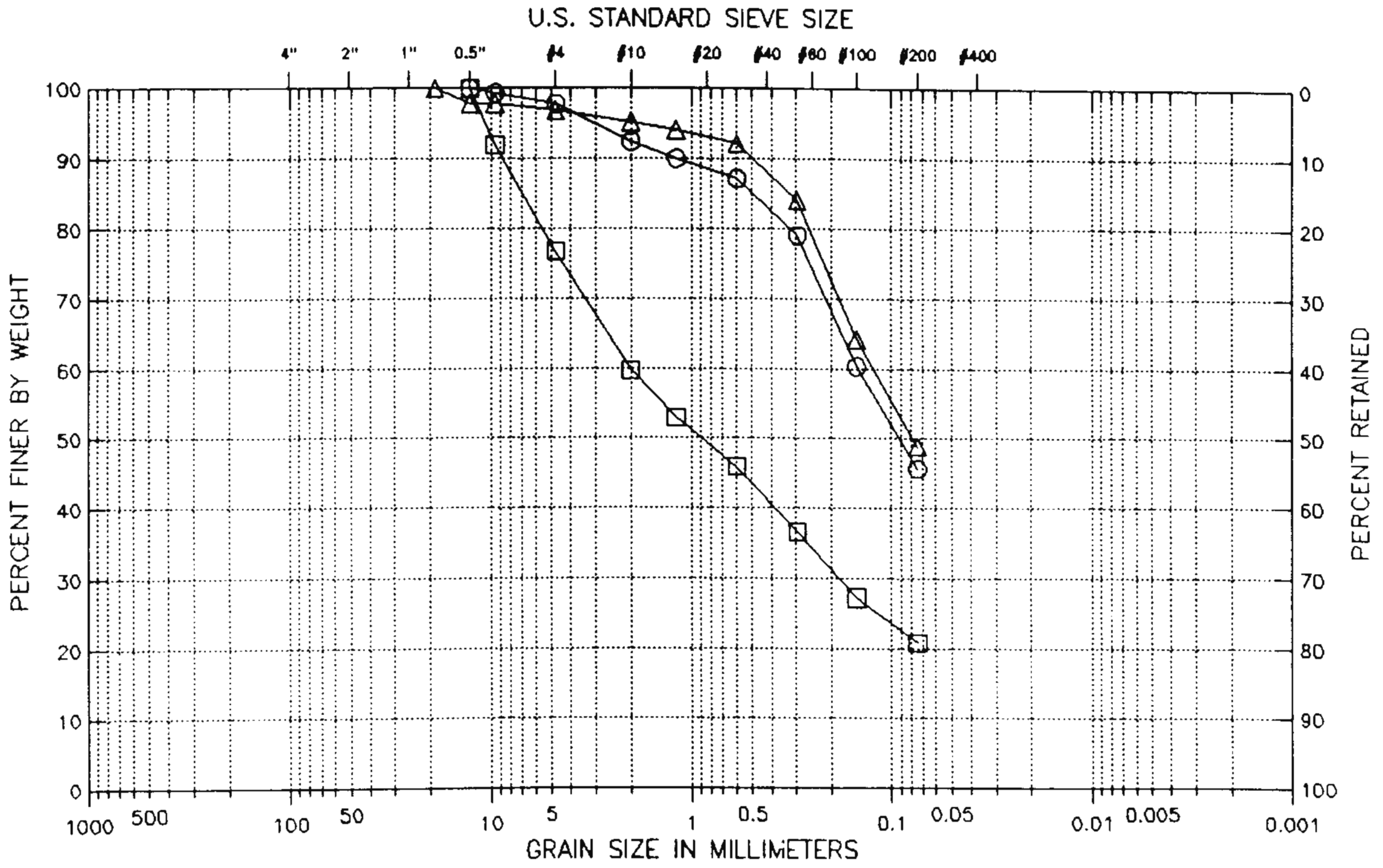
Remarks : Depth: 34.5-35.0 feet

Natural Moisture Content

Moisture Content ID	Mass of Container (gm)	Mass of Container and Moist Soil (gm)	Mass of Container and Dried Soil (gm)	Moisture Content (%)
1) 65-01-34	185.80	335.25	326.62	6.13

Average Moisture Content = 6.13

Project : LEVINE FRICKE RECON 6730.00-024
Project No.: 16148A
Location: SCVWD MTBE
Date : Wed Dec 16 1998



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

Symbol	Boring No.	Sample No.	Depth	Filename	Classification / Description
○	065-BH-01	13.0-13.5 SV	13.0-13.5 FT.	065-13	BROWN CLAYEY SILTY SAND
△	065-BH-01	23.0-23.5 SV	23.0-23.5 FT.	065-23	BROWN SA-SI CLAY TO CLAYEY SI-SAND W/ FINE GRAVEL
□	065-BH-01	34.5-35.0 SV	34.5-35.0 FT.	065-34	GRAY BROWN CLAYEY SILTY SAND WITH FINE GRAVEL

Figure 1

URS Greiner Woodward Clyde

SANTA CLARA VALLEY WATER DISTRICT
Pilot Study of Operating Underground Storage Tanks
Santa Clara County, California

Site Report

SITE NUMBER 071

Chevron #7289
2701 McKee Road
San Jose, California 95127

May 7, 1999

This Site Report is one of a series of reports prepared for the Santa Clara Valley Water District's Pilot Study of Operating Underground Storage Tanks. The District funded this study to assess if MtBE is being released from UST systems that meet 1998 federal- and state-mandated upgrade requirements. The District will use the results of the Pilot Study, and possibly information obtained during subsequent investigations, to evaluate whether up-graded UST systems that handle MtBE are protective of groundwater quality, and ultimately drinking water. This Study and other District groundwater vulnerability assessments are critical in formulating a plan to protect drinking water supplies into the future.

With assistance from the San Jose Fire Department, LFR Levine·Fricke completed a file review and conducted soil and groundwater sampling adjacent to this site on behalf of the District. This report provides a brief summary of investigation findings, and site-specific data in tables, figures, and appendices. This Site Report is appended to the Summary Report for the Study.

LFR
LEVINE·FRICKE
1900 Powell Street, 12th Floor
Emeryville, California 94608-1827
(510) 652-4500/Fax (510) 652-2246

SUMMARY OF FINDINGS

SITE DESCRIPTION

Figure 1 illustrates the site location. Site geology consists primarily of alternating layers of gravels and silts to approximately 65 feet below ground surface (bgs). Cobbles were encountered in most of the borings. The shallowest depth to groundwater measured was approximately 61 feet bgs.

SYSTEM DESCRIPTION

Records indicate that the UST system at the site consists of three 10,000-gallon double-walled USTs constructed of fiberglass with 100 % methanol compatible interior lining, fiberglass reinforced plastic (FRP) exterior corrosion protection, and double-walled fiberglass piping. The UST system utilizes continuous interstitial monitoring for both piping and UST leak detection as well as automatic tank gauging for UST leak detection. Field observations indicate the UST system utilizes a balanced vapor recovery system.

RESULTS

MtBE was not detected in the 7 soil samples or 3 groundwater samples collected from borings drilled adjacent to this Site. Toluene was detected in 2 of 7 soil samples at concentrations of 14 μg/kg and 16 μg/kg.

SITE SELECTION CRITERIA MET

1998 upgrade compliant?	Yes
On SCVWD fuel leak database?	No
Status:	Not applicable
Distance from LUST site:	Less than 250 feet
Distance to water supply well:	Less than 2000 feet
Access granted?	No
SCVWD approved?	Yes

FILE REVIEW SUMMARY

Number of tanks:	3
Reported release?	No
Release date:	Not applicable
Fuel released:	Not applicable
Location:	Not applicable
Quantity (gallons):	Not applicable
Data available:	Not applicable

Comments:

Analytical results for soil samples collected during dispenser and product line replacement did not indicate the presence of petroleum hydrocarbons or MtBE.

SITE VISIT - UST SYSTEM INFORMATION

UST system inspection not conducted for off-site investigations.

SITE INSPECTION

Site inspection not conducted for off-site investigations.

UST SYSTEM DATA FROM FORM B COLLECTED DURING FILE REVIEWS - TANK ID # 1 Plus

Date installed:	1987
Tank capacity (gallons):	10,000
Tank contents:	Midgrade unleaded
Tank construction:	
Type of system:	Double wall
Tank material (primary tank):	Fiberglass
Lining compatible with 100% methanol:	Yes
Exterior corrosion protection:	Fiberglass reinforced plastic
Date spill containment installed:	1997
Date overfill protection equipment installed:	1997
Drop tube:	Not noted
Striker plate:	Not noted
Dispenser containment:	Not noted
Piping information:	
System type:	Pressure, underground
Construction:	Double wall, underground
Material and corrosion protection:	Fiberglass pipe, underground
Leak detection:	Continuous interstitial monitoring
Tank leak detection?	Automatic tank gauging Continuous interstitial monitoring

UST SYSTEM DATA FROM FORM B COLLECTED DURING FILE REVIEWS - TANK ID # 2 Supreme

Date installed:	1987
Tank capacity (gallons):	10,000
Tank contents:	Premium unleaded
Tank construction:	
Type of system:	Double wall
Tank material (primary tank):	Fiberglass

Lining compatible with 100% methanol:	Yes
Exterior corrosion protection:	Fiberglass reinforced plastic
Date spill containment installed:	1997
Date overfill protection equipment installed:	1997
Drop tube:	Not noted
Striker plate:	Not noted
Dispenser containment:	Not noted
Piping information:	
System type:	Pressure, underground
Construction:	Double wall, underground
Material and corrosion protection:	Fiberglass pipe, underground
Leak detection:	Continuous interstitial monitoring
Tank leak detection?	Automatic tank gauging Continuous interstitial monitoring

UST SYSTEM DATA FROM FORM B COLLECTED DURING FILE REVIEWS - TANK ID # 3-Unleaded

Date installed:	1987
Tank capacity (gallons):	10,000
Tank contents:	Regular unleaded
Tank construction:	
Type of system:	Double wall
Tank material (primary tank):	Fiberglass
Lining compatible with 100% methanol:	Yes
Exterior corrosion protection:	Fiberglass reinforced plastic
Date spill containment installed:	1997
Date overfill protection equipment installed:	1997
Drop tube:	Not noted
Striker plate:	Not noted
Dispenser containment:	Not noted
Piping information:	
System type:	Pressure, underground
Construction:	Double wall, underground
Material and corrosion protection:	Fiberglass pipe, underground
Leak detection:	Continuous interstitial monitoring
Tank leak detection?	Automatic tank gauging Continuous interstitial monitoring

Table 1
Summary of Chemical Analysis Results for Soil Samples - Site #071
Santa Clara Valley Water District

Location	Date Sampled	Depth (ft bgs)	Methyl Tertiary Butyl Ether (MTBE) ug/Kg	TPH as Gasoline (TPHg) mg/Kg	Benzene (B) ug/Kg	Toluene (T) ug/Kg	Ethyl Benzene (E) ug/Kg	meta/para-Xylenes (m/p-X) ug/Kg	ortho-Xylene (o-X) ug/Kg	Di-isopropyl Ether (DIPE) ug/Kg	Ethyl Tertiary Butyl Ether (ETBE) ug/Kg	Tertiary Amyl Methyl Ether (TAME) ug/Kg	Tertiary Butyl Alcohol (TBA) ug/Kg
071-BH-01	02/26/99	11.5-12.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		20.0-20.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
071-BH-02	03/15/99	7.5-8.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		18.5-19.0	<5	<1	<5	16	<5	<5	<5	<20	<20	<20	<200
		23.5-24.0	<5	<1	<5	14	<5	<5	<5	<20	<20	<20	<200
071-BH-05	03/05/99	24.0-24.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		28.5-29.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200

Table proofed by CLC.

Notes:

All samples were analyzed by Alpha Analytical, Inc. of Sparks, NV, using EPA Method 8260 for MTBE, BTEX, DIPE, ETBE, TAME, and TBA, and Modified EPA Method 8015 for TPHg.

ft bgs = feet below ground surface
mg/Kg = milligrams per kilogram
TPH = total petroleum hydrocarbons
ug/Kg = micrograms per kilogram

Data Qualifiers (if shown on table):

J = Estimated value
UJ =Not detected at the estimated reporting limit shown

Table 2
Summary of Chemical Analysis Results for Groundwater Samples - Site # 071
Santa Clara Valley Water District

Location	Date Sampled	Depth (ft bgs)	Methyl Tertiary Butyl Ether (MTBE) ug/L	TPH as Gasoline (TPHg) mg/L	Benzene (B) ug/L	Toluene (T) ug/L	Ethyl Benzene (E) ug/L	meta/para-Xylenes (m/p-X) ug/L	ortho-Xylene (o-X) ug/L	Di-isopropyl Ether (DIPE) ug/L	Ethyl Tertiary Butyl Ether (ETBE) ug/L	Tertiary Amyl Methyl Ether (TAME) ug/L	Tertiary Butyl Alcohol (TBA) ug/L
071-BH-04	03/05/99	62.0-65.0	<0.5	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<10
071-BH-05	03/05/99	60.0-62.0	<0.5	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<10
071-BH-05-DUP		60.0-62.0	<0.5	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<10

Table proofed by CLC.

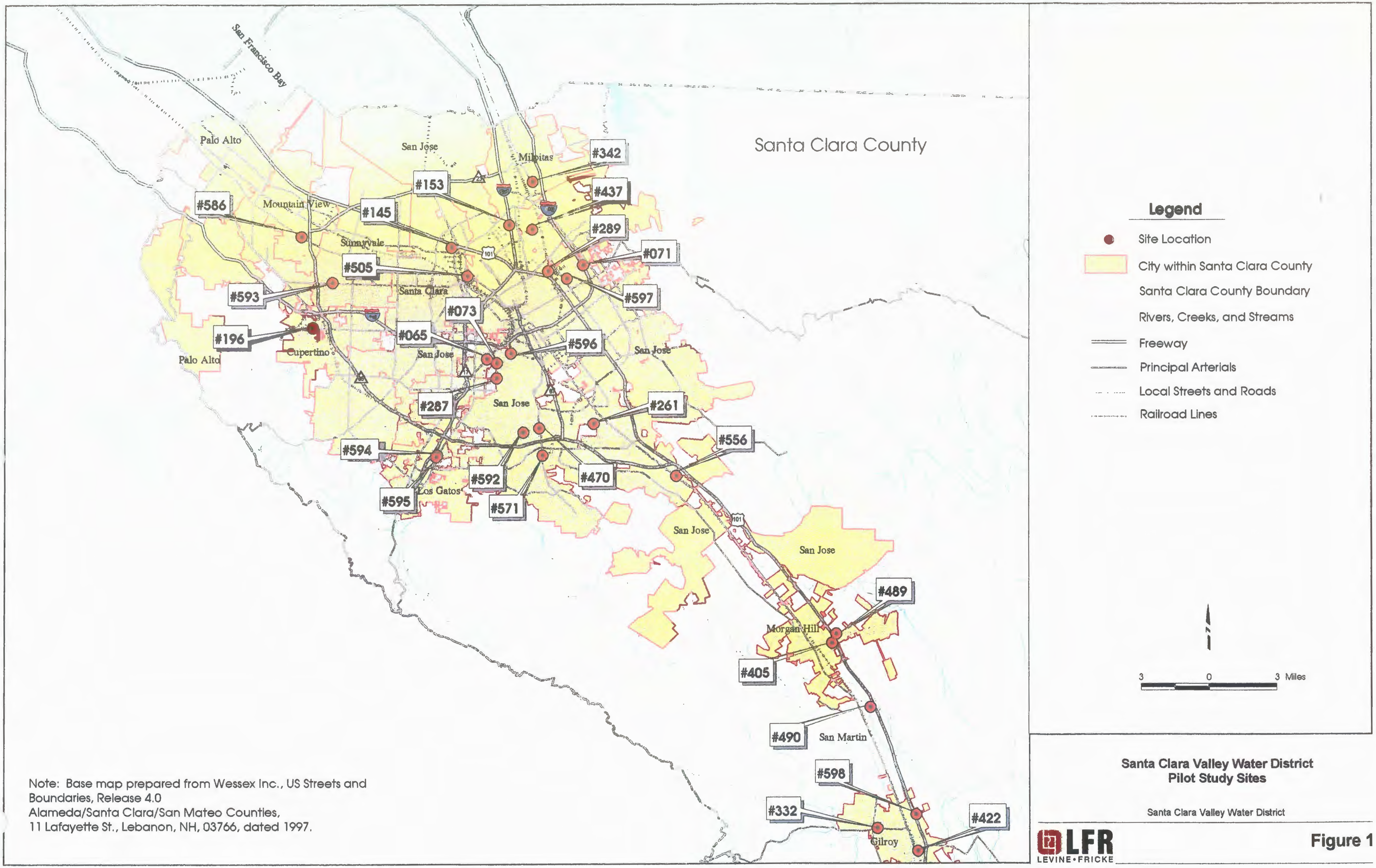
Notes:

All primary and field duplicate (-DUP) samples were analyzed by Alpha Analytical, Inc. of Sparks, NV, using EPA Method 8260 for MTBE, BTEX, DIPE, ETBE, TAME, and TBA, and Modified EPA Method 8015 for TPHg.

ft bgs = feet below ground surface
mg/L = milligrams per liter
TPH = total petroleum hydrocarbons
ug/L = micrograms per liter

Data Qualifiers (if shown on table):

J = Estimated value
UJ =Not detected at the estimated reporting limit shown



Note: Base map prepared from Wessex Inc., US Streets and Boundaries, Release 4.0
Alameda/Santa Clara/San Mateo Counties,
11 Lafayette St., Lebanon, NH, 03766, dated 1997.

Santa Clara Valley Water District
Pilot Study Sites

Santa Clara Valley Water District

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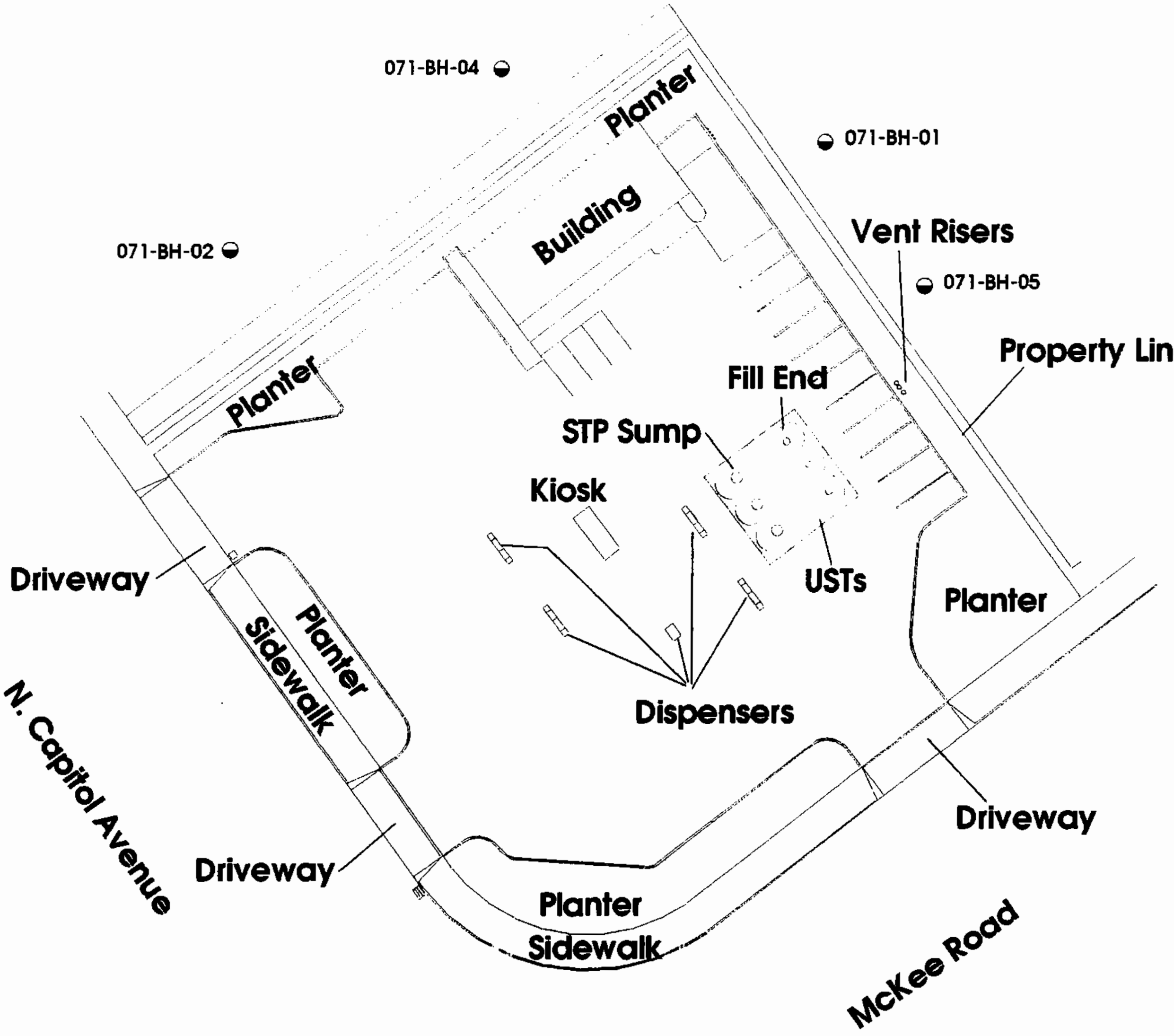
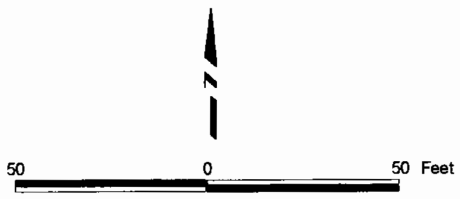
Figure 1





Legend

UST - Underground Storage Tank

◌ Underground Storage Tank (UST) access port

STP - Submersible turbine pump

☐ Concrete slab

▤ Storm Drain Catch Basin

◒ Soil and groundwater sampling location

Note: Base map prepared from LFR field plan.

Site #071

Site Plan

Santa Clara Valley Water District

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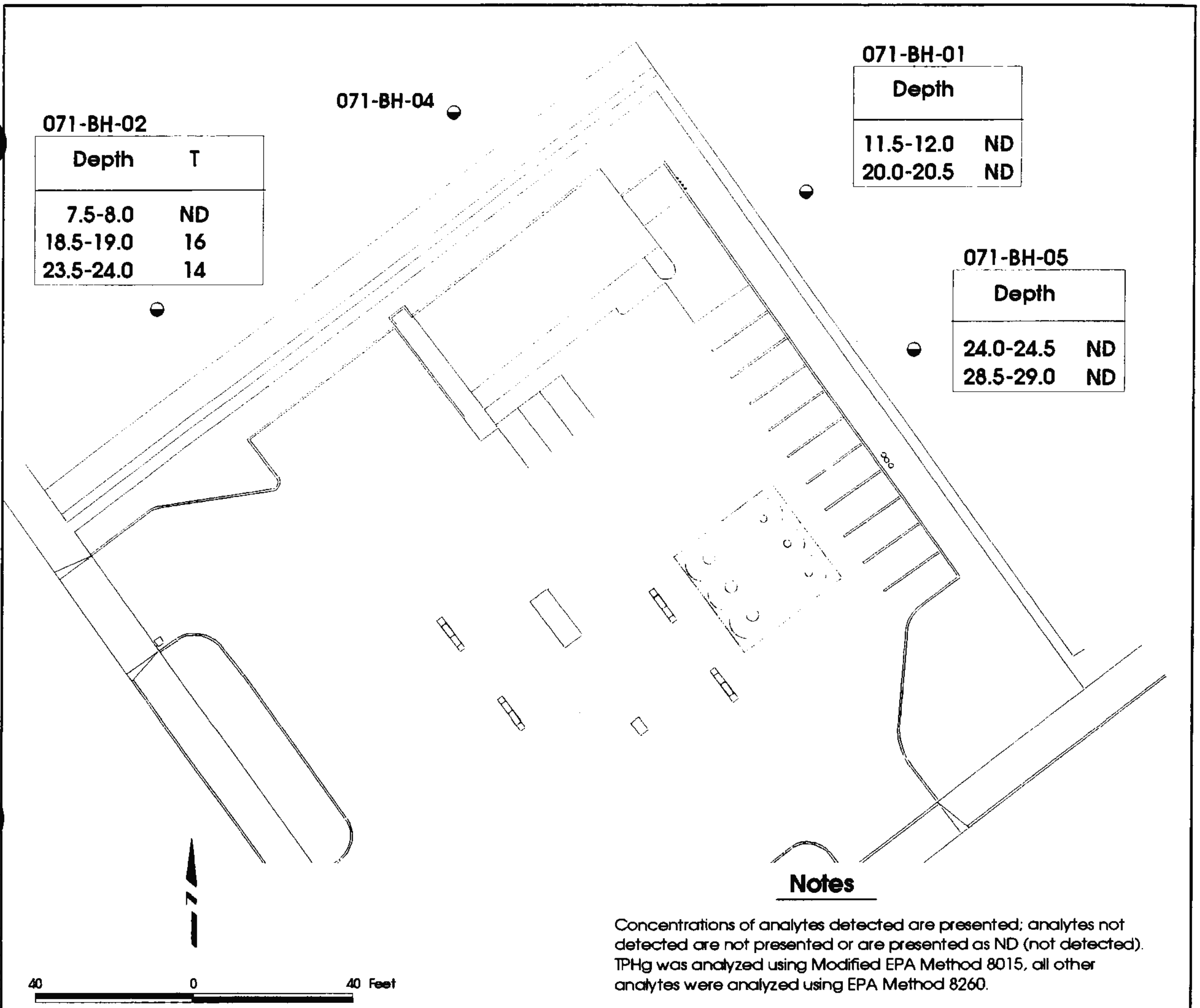
Figure 2



071-BH-02

Depth	T
7.5-8.0	ND
18.5-19.0	16
23.5-24.0	14

071-BH-01

Depth	
11.5-12.0	ND
20.0-20.5	ND

071-BH-05

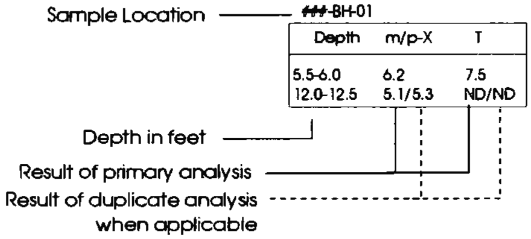
Depth	
24.0-24.5	ND
28.5-29.0	ND

Legend

◒ Soil and groundwater sampling location

○ Underground Storage Tank (UST(access port

The following represents a hypothetical sampling point and defines the characters associated with that point:


Sample Location
###-BH-01
Depth in feet
Result of primary analysis
Result of duplicate analysis when applicable

Depth	m/p-X	T
5.5-6.0	6.2	7.5
12.0-12.5	5.1/5.3	ND/ND

⬚ Concrete slab

▤ Storm Drain Catch Basin

See Figure 2 for description of site features and origin of base map.

Notes

Concentrations of analytes detected are presented; analytes not detected are not presented or are presented as ND (not detected). TPHg was analyzed using Modified EPA Method 8015, all other analytes were analyzed using EPA Method 8260.

Results in micrograms/kilogram (ug/Kg) for all compounds except TPHg which is presented in milligrams/kilogram (mg/Kg).

RL = Reporting Limit

Each sample was analyzed for the following:

MTBE = Methyl Tertiary Butyl Ether (RL = 5 ug/Kg)
TPHg = Total Petroleum Hydrocarbons as Gasoline (RL = 1 mg/Kg)
B = Benzene (RL = 5 ug/Kg)
T = Toluene (RL = 5 ug/Kg)
E = Ethyl Benzene (RL = 5 ug/Kg)
m/p-X = meta/para-Xylenes (RL = 5 ug/Kg)
o-X = ortho-Xylene (RL = 5 ug/Kg)
DIPE = Di-isopropyl Ether (RL = 20 ug/Kg)
ETBE = Ethyl Tertiary Butyl Ether (RL = 20 ug/Kg)
TAME = Tertiary Amyl Methyl Ether (RL = 20 ug/Kg)
TBA = Tertiary Butyl Alcohol (RL = 200 ug/Kg)

Site #071

Summary of Chemical Analysis Results for Soil Samples

Santa Clara Valley Water District

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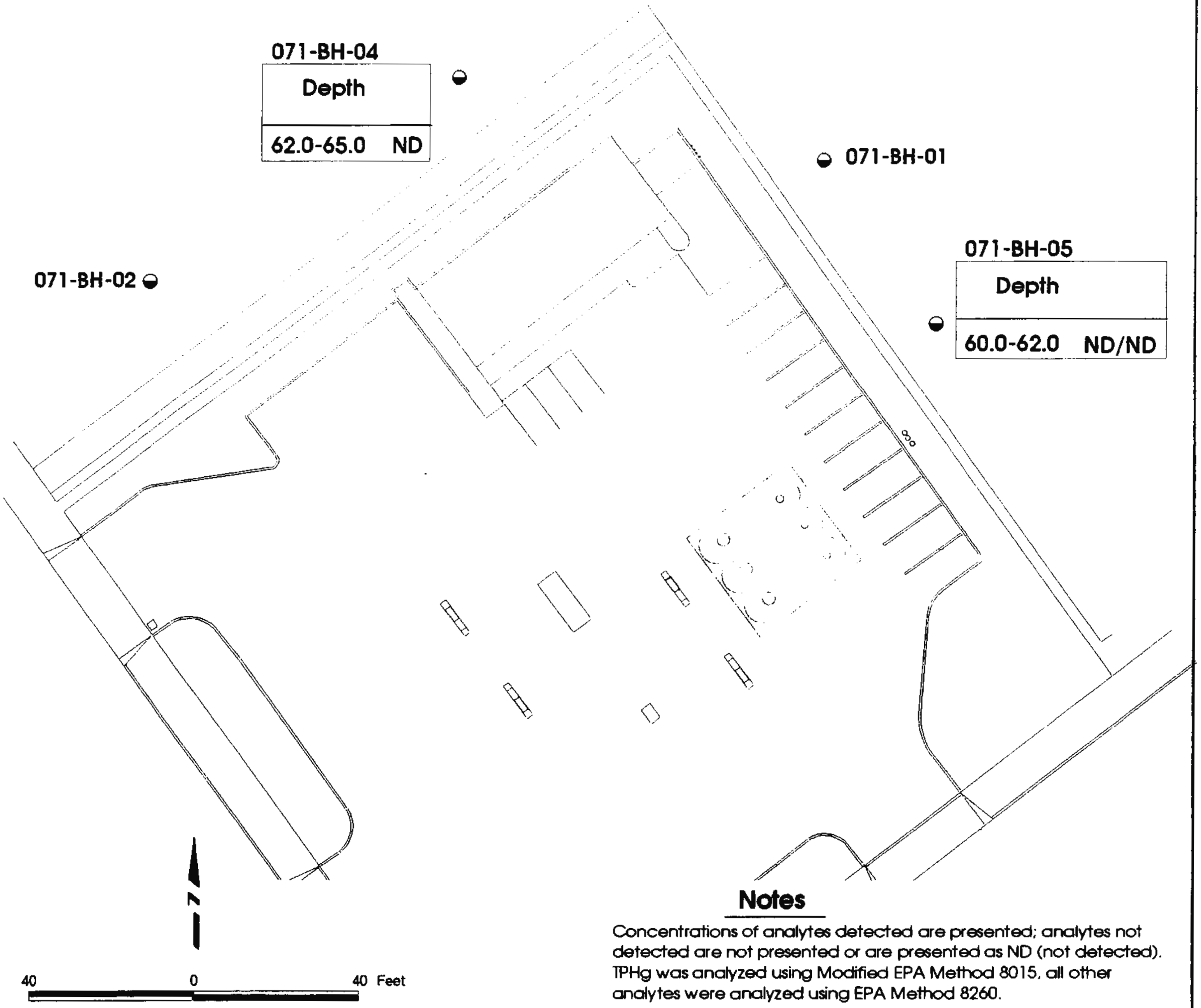
Figure 3



Notes

Concentrations of analytes detected are presented; analytes not detected are not presented or are presented as ND (not detected). TPHg was analyzed using Modified EPA Method 8015, all other analytes were analyzed using EPA Method 8260.

Results in micrograms/liter (ug/L) for all compounds except TPHg which is presented in milligrams/liter (mg/L).

RL = Reporting Limit

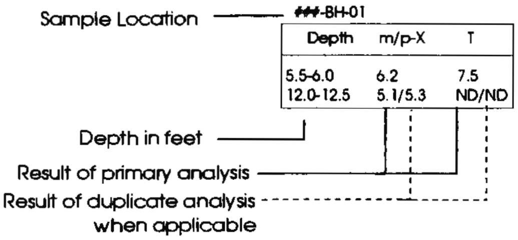
Each sample was analyzed for the following:

= Methyl Tertiary Butyl Ether (RL = 0.5 ug/L)
TPHg = Total Petroleum Hydrocarbons as Gasoline (RL = 0.05 mg/L)
B = Benzene (RL = 0.5 ug/L)
T = Toluene (RL = 0.5 ug/L)
E = Ethyl Benzene (RL = 0.5 ug/L)
m/p-X = meta/para-Xylenes (RL = 0.5 ug/L)
o-X = ortho-Xylene (RL = 0.5 ug/L)
DIPE = Di-isopropyl Ether (RL = 1 ug/L)
ETBE = Ethyl Tertiary Butyl Ether (RL = 1 ug/L)
TAME = Tertiary Amyl Methyl Ether (RL = 1 ug/L)
TBA = Tertiary Butyl Alcohol (RL = 10 ug/L)

Legend

◒ Soil and groundwater sampling location
○ Underground Storage Tank (UST) access port

The following represents a hypothetical sampling point and defines the characters associated with that point:



▭ Concrete slab
▤ Storm Drain Catch Basin

See Figure 2 for description of site features and origin of base map.

Site #071

Summary of Chemical Analysis Results for Groundwater Samples

Santa Clara Valley Water District

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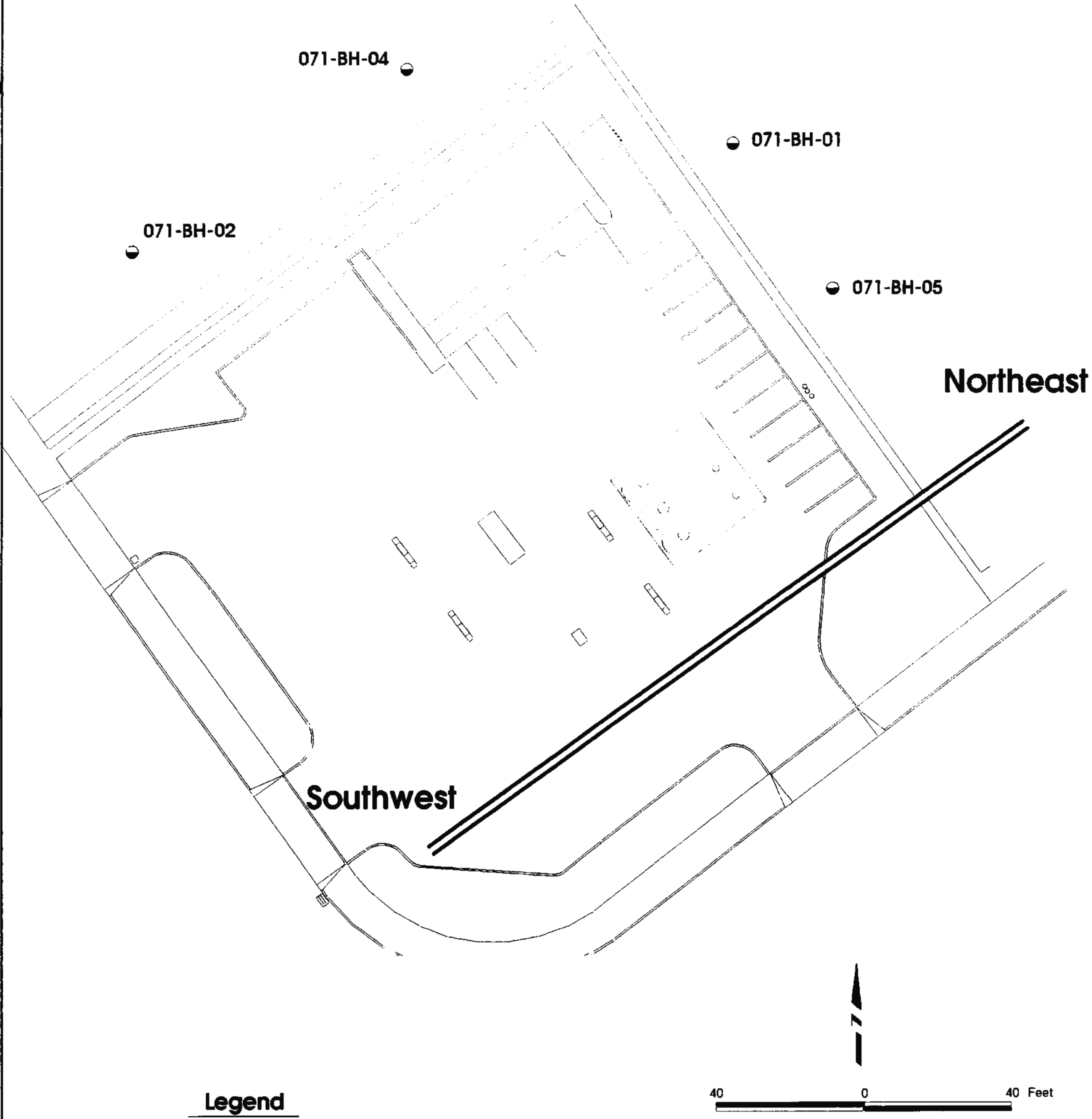
Figure 4



Legend

◒ Soil and groundwater sampling location

○ Underground Storage Tank (UST) access port

▭ Concrete slab

▤ Storm Drain Catch Basin

See Figure 2 for description of site features and origin of base map.

Site #071

Site Plan Showing Orientation of Vertical Profile

Santa Clara Valley Water District

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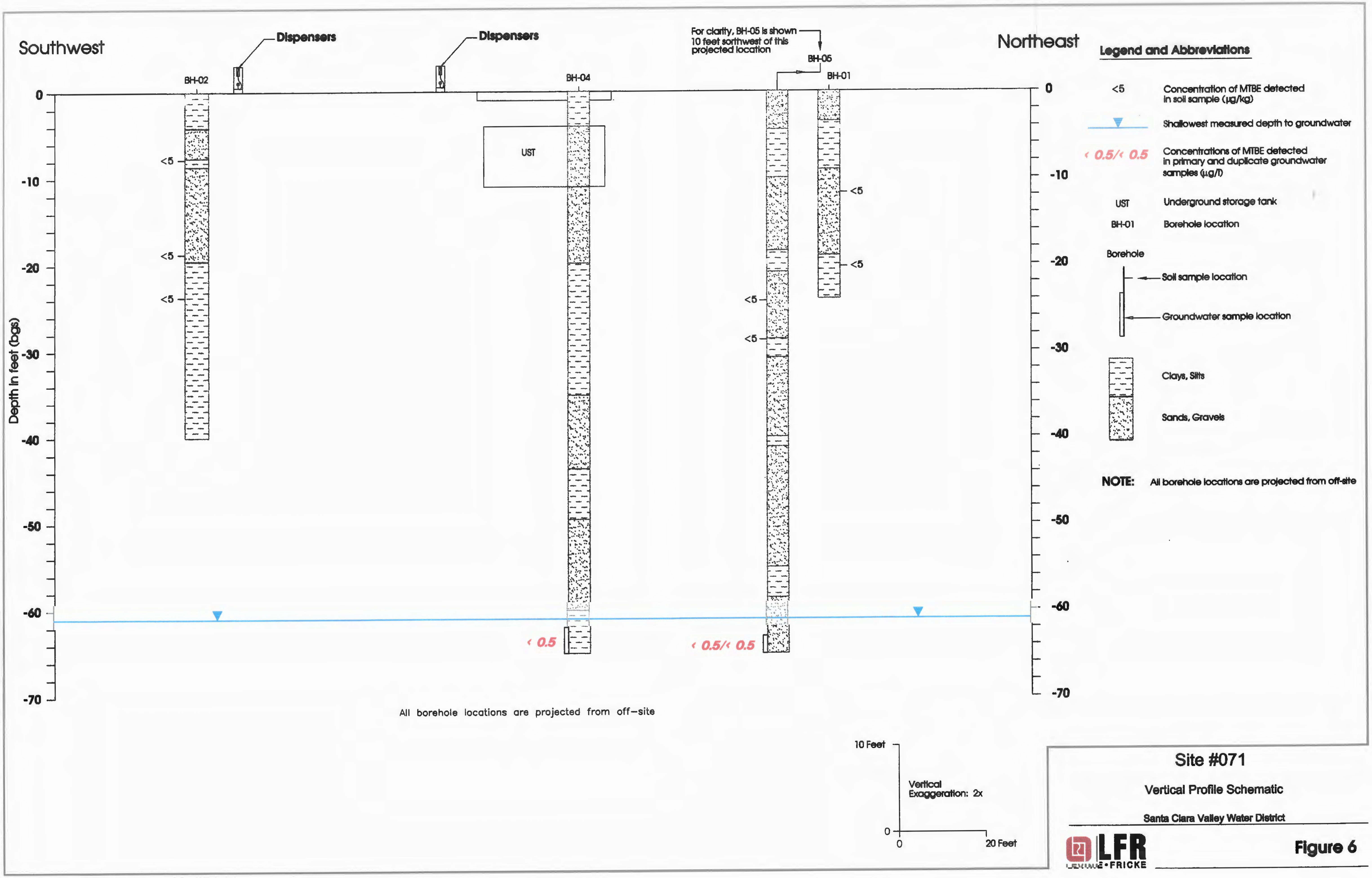
Figure 5


Southwest
Dispensers
Dispensers
For clarity, BH-05 is shown 10 feet sorthwest of this projected location
Northeast
BH-02
BH-04
BH-05
BH-01
UST
<5
<5
<5
<5
<5
<5
<5
< 0.5
< 0.5/< 0.5
Depth in feet (bgs)
0
-10
-20
-30
-40
-50
-60
-70
0
-10
-20
-30
-40
-50
-60
-70
All borehole locations are projected from off-site
10 Feet
Vertical Exaggeration: 2x
0
0
20 Feet
Legend and Abbreviations
<5
Concentration of MTBE detected in soil sample (µg/kg)
Shallowest measured depth to groundwater
< 0.5/< 0.5
Concentrations of MTBE detected in primary and duplicate groundwater samples (µg/l)
UST
Underground storage tank
BH-01
Borehole location
Borehole
Soil sample location
Groundwater sample location
Clays, Silts
Sands, Gravels
NOTE: All borehole locations are projected from off-site

Site #071

Vertical Profile Schematic

Santa Clara Valley Water District

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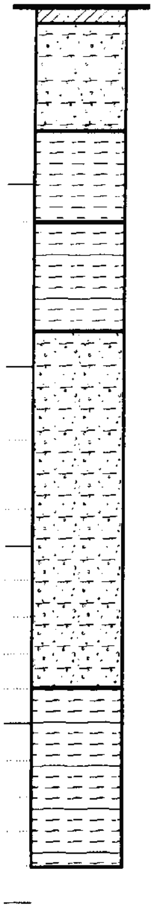
Figure 6

J:\ENGCAD\6730\CM\#071.DWG 04/30/99 x-sec.PCP

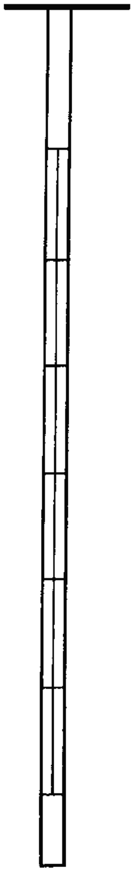
SCVWD PILOT STUDY

Depth, feet	Water Level	PID Reading (ppm)	Lithologic Description
			ASPHALT.
			SILTY to SANDY GRAVEL (GM), brown, dry, very dense.
			SILT (ML), brown, dry, very dense, with very fine sand.
5		0.0	
		0.0	CLAYEY SILT (ML), dry, very stiff, some gravel.
		0.0	
		0.0	
10		0.0	SILTY GRAVEL (GM), brown, dry, very dense, gravels up to 1-inch diameter.
		0.0	
		0.0	
15			Chert like pieces.
		0.0	
		0.0	
		0.0	
		0.0	CLAYEY SILT (ML), brown, dry, very stiff, some gravels and sand.
20			
		0.0	
			BOTTOM OF BORING AT 24 FEET.
25			
30			
35			

Graphic Log



Sample Interval



REGISTERED GEOLOGIST
JENIFER J. BEATTY
No. 6650
Exp. 1/31/01
STATE OF CALIFORNIA

EXPLANATION

▤	Clay
▤	Silt
▨	Sand
▨	Gravel

PID - Photoionization Detector

▼ Water level at time of drilling

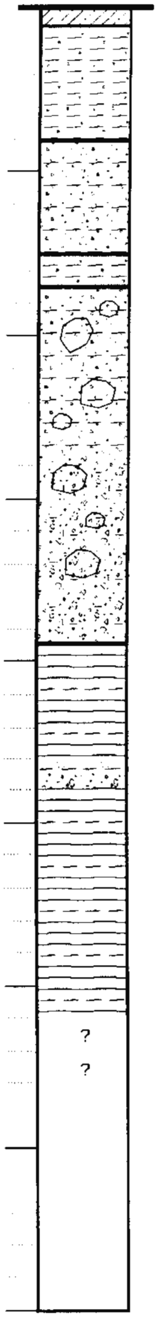
Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: February 26, 1999
LFR Geologist: Thomas Zakaria, R.G., CH.G.

LFR
LEVINE•FRICKE

LITHOLOGY FOR 071-BH-01 *(page 1 of 1)*

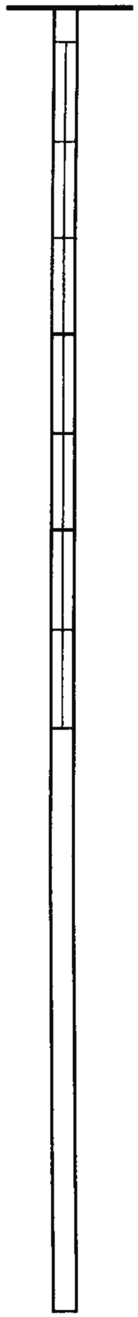
Project No. 6730.00-024

SCVWD PILOT STUDY



Depth, feet	Water Level	PID Reading (ppm)	Lithologic Description
			4" thick ASPHALT.
			GRAVELLY SILT (ML), light yellowish brown, dry.
5			SILTY GRAVEL (GM), light brownish yellow, dry, hard, predominantly cobbles and angular fractured clasts, friable sandstone, Fill?
		0.0	
			GRAVELLY SILT (ML), light brown, dry, hard.
		0.0	SILTY GRAVEL (GM) to SILTY SANDY GRAVEL (GM) with COBBLES as above, brownish gray, moist, heterogenous, with dark gray clasts, dense, well graded.
10			
		0.0	
		0.0	
15			
		0.0	
			SILTY CLAY (CL), yellowish brown, slightly moist, stiff, very low to medium plasticity, trace gravel, increase silt with depth.
20		0.0	
			Moist, very silty with fine sand. Thin bed of subangular fine gravel.
		2.0	
25			
		0.0	
			Sandy, moist, trace gravel.
30		0.0	
35			
40			BOTTOM OF BORING AT 40 FEET.

Sample Interval



JENIFER J. B
No. 6650
Exp. [illegible]

EXPLANATION

▤	Clay
▤	Silt
░	Sand
▒	Gravel

PID - Photoionization Detector

▼ Water level at time of drilling

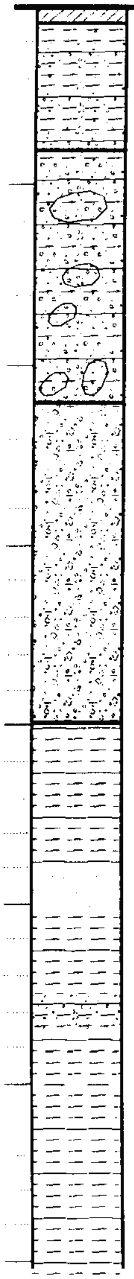
Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: March 1, 1999
LFR Geologist: Todd Miller, R.G., CH.G.

LFR
LEVINE·FRICKE

LITHOLOGY FOR 071-BH-02 *(page 1 of 1)*

Project No. 6730.00-024

SCVWD PILOT STUDY



Depth, feet	Water Level	PID Reading (ppm)	Lithologic Description
			4 to 5" thick ASPHALT.
			GRAVELLY CLAYEY SILT (ML), light brown.
5		0.0	CLAYEY SILTY GRAVEL (GM), yellowish brown, slightly moist, dense, angular, well graded. Siltstone cobble.
		0.0	Cobbles/gravel.
10			Cobbles.
			SILTY SANDY GRAVEL (GM), light yellowish brown to brown, slightly moist, medium dense, well graded, clasts to 1.5 centimeters, subangular, coarse sand.
15			SILTY SANDY GRAVEL (GM), dark grayish brown, hard, dry to moist, well graded, angular, serpentine sandstone, siltstone.
20			CLAYEY SILT (ML), yellowish brown, slightly moist, medium stiff, low plasticity.
25			Sand interbed.
			Increased gravel.
30			Increased sand.
			CLAYEY SILT (ML), yellowish brown, slightly moist, very stiff, very low plasticity, trace coarse sand.
35			

Sample Interval

JENIFER J. BEATTY
No. 6650
Exp. 4/30/01

Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: March 1 & 2, 1999
LFR Geologist: Todd Miller, R.G., CH.G.

EXPLANATION

☰	Clay
☷	Silt
⬚	Sand
▨	Gravel

PID - Photoionization Detector

▼ Water level at time of drilling

LFR
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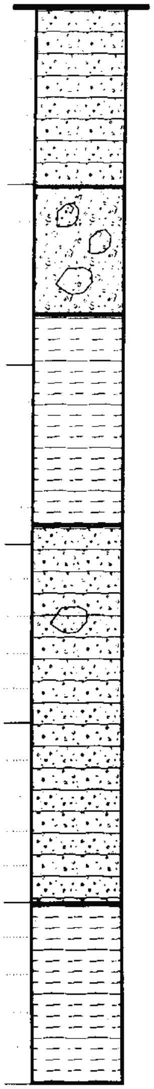
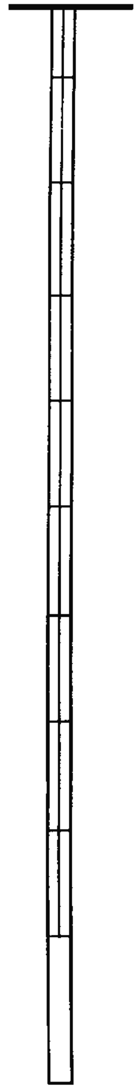
LITHOLOGY FOR 071-BH-04 *(page 1 of 2)*

Project No. 6730.00-024

SCVWD PILOT STUDY





Depth, feet	Water Level	PID Reading (ppm)	Lithologic Description
			CLAYEY GRAVEL (GC), grayish brown, moist, medium dense, well graded, subrounded to 3 centimeters, predominantly fine gravel, some sand and silt.
40			SANDY GRAVEL (GW), grayish brown, moist, loose, well graded, clasts to cobbles size, some clay and silt.
45			CLAYEY SILT (ML), mottled yellowish brown and tan, slightly moist, stiff, very low plasticity.
50			CLAYEY SANDY GRAVEL (GC), olive-brown, moist to very moist, medium dense, well graded, angular, clasts to 4 centimeters, heterogenous assemblage of weathered clasts, sand is medium grained.
55			Decreased clay content.
60			CLAYEY SANDY SILT (ML), olive-brown, very moist, soft, non plastic, fine sand. Wet gravel layer at 60.5 feet.
65			BOTTOM OF BORING AT 65 FEET.
70			

JENIFER J.
No. 6650
Exp. 9/30/01

Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: March 5, 1999
LFR Geologist: Todd Miller, R.G., CH.G.

EXPLANATION

▤	Clay
┅	Silt
░	Sand
▒	Gravel

PID - Photoionization Detector

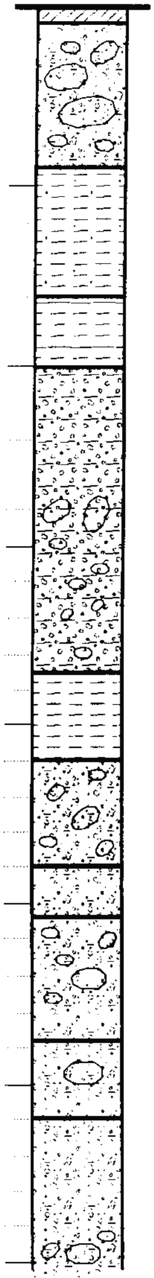
▼ Water level at time of drilling

LFR
LEVINE•FRICKE

LITHOLOGY FOR 071-BH-04 *(page 2 of 2)*

Project No. 6730.00-024

SCVWD PILOT STUDY



Depth, feet	Water Level	PID Reading (ppm)	Lithologic Description
			4" thick ASPHALT.
			COBBLES, silty, quartz and sandstone.
5			SANDY SILT (ML), light brown, dry, very stiff, trace angular gravel.
			CLAYEY SILT (ML), light yellowish brown, dry, very stiff.
10			
			SILTY GRAVEL (GM), light brownish gray to tan, dry, very dense, well graded to 3 centimeters, subangular.
			COBBLES.
15			
			SILTY GRAVEL (GM), grayish tan, dry, loose, well graded to cobble size, subrounded.
		0.0	
		0.0	SILT (ML), tan, dry, very stiff, trace fine angular gravel.
20			
		0.0	
		0.0	SILTY SANDY GRAVEL (GM), light grayish brown, slightly moist, loose, well graded to cobble size.
		0.0	
		0.0	GRAVELLY SAND (SW), light olive-brown, moist, medium dense, well graded, coarse sand, subangular, trace clay.
25			SILTY SANDY GRAVEL (GM), as described at 22 feet.
		0.0	
		0.0	
			CLAYEY SILT (ML), grayish brown, slightly moist, low plasticity.
30		0.0	COBBLE.
		0.0	
		0.0	SILTY SANDY GRAVEL (GM), grayish brown, slightly moist, medium dense, well graded.
		0.0	
35		0.0	COBBLES.

Sample Interval

cont....

Drilling Method:	Dual-Tube/Direct Push
Drilling Company:	Precision
Date Well Drilled:	March 2, 1999
LFR Geologist:	Todd Miller, R.G., CH.G.

REGISTERED GEOLOGIST
JENIFER J. BEATTY
No. 6650
Exp. 4/30/01
STATE OF CALIFORNIA

EXPLANATION

▤ Clay

▤ Silt

▨ Sand

▨ Gravel

PID - Photoionization Detector

▼ Water level at time of drilling

LFR
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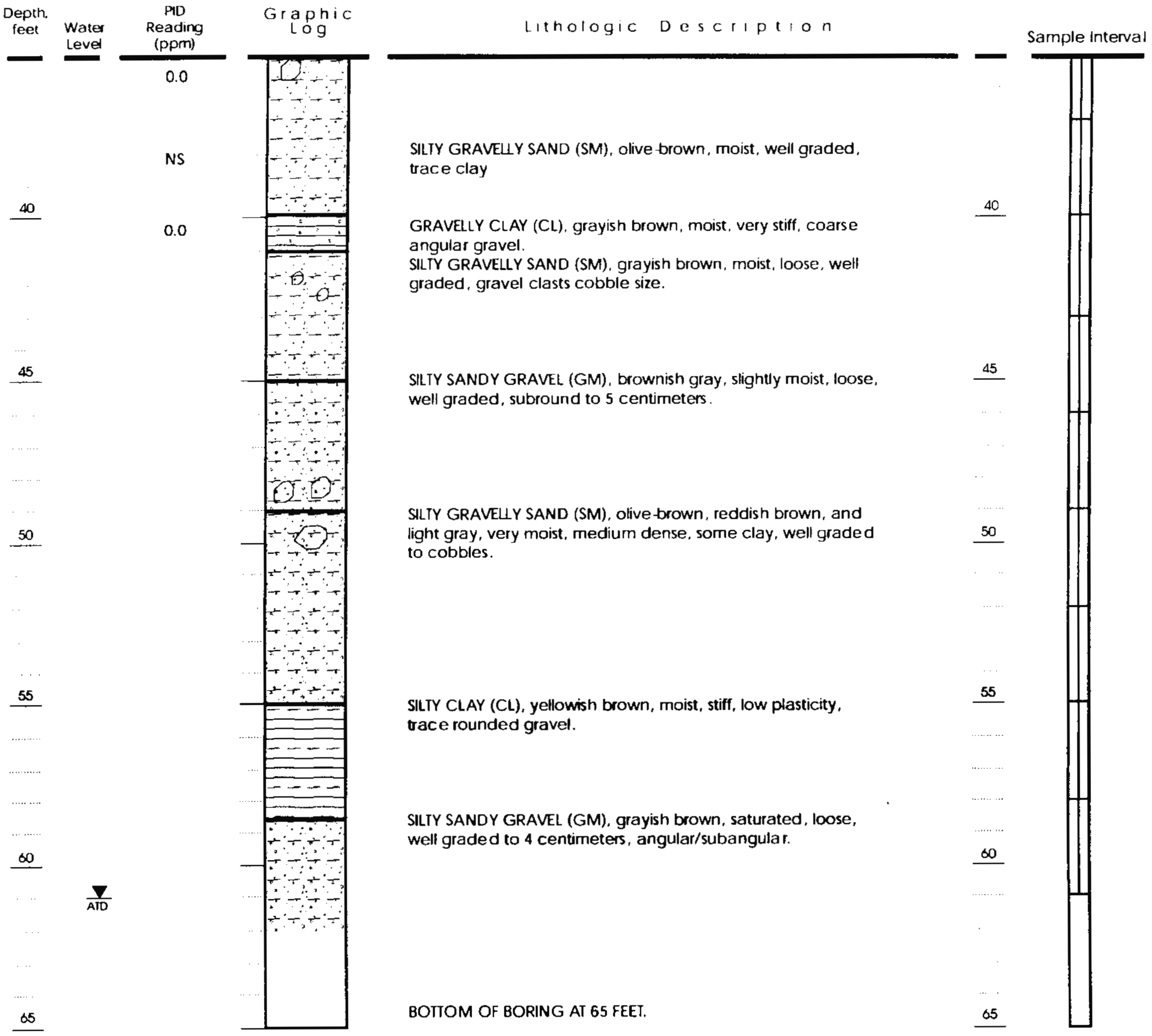
LITHOLOGY FOR 071-BH-05 *(page 1 of 2)*

Project No. 6730.00-024

SCVWD PILOT STUDY



SILTY GRAVELLY SAND (SM), olive-brown, moist, well graded, trace clay

GRAVELLY CLAY (CL), grayish brown, moist, very stiff, coarse angular gravel.

SILTY GRAVELLY SAND (SM), grayish brown, moist, loose, well graded, gravel clasts cobble size.

SILTY SANDY GRAVEL (GM), brownish gray, slightly moist, loose, well graded, subround to 5 centimeters.

SILTY GRAVELLY SAND (SM), olive-brown, reddish brown, and light gray, very moist, medium dense, some clay, well graded to cobbles.

SILTY CLAY (CL), yellowish brown, moist, stiff, low plasticity, trace rounded gravel.

SILTY SANDY GRAVEL (GM), grayish brown, saturated, loose, well graded to 4 centimeters, angular/subangular.

BOTTOM OF BORING AT 65 FEET.

70 70

JENIFER J.
No. 6650
Exp. [illegible]

Drilling Method:	Dual-Tube/Direct Push
Drilling Company:	Precision
Date Well Drilled:	March 5, 1999
LFR Geologist:	Todd Miller, R.G., CH.G.

EXPLANATION

▤ Clay

▤ Silt

▨ Sand

▨ Gravel

PID - Photoionization Detector

▼ Water level at time of drilling

LITHOLOGY FOR 071-BH-05 *(page 2 of 2)*

SANTA CLARA VALLEY WATER DISTRICT

Pilot Study of Operating Underground Storage Tanks

Santa Clara County, California

Site Report

SITE NUMBER 073

Unocal #3364
1104 Meridian Road
San Jose, California 95126

April 27, 1999

This Site Report is one of a series of reports prepared for the Santa Clara Valley Water District's Pilot Study of Operating Underground Storage Tanks. The District funded this study to assess if MtBE is being released from UST systems that meet 1998 federal- and state-mandated upgrade requirements. The District will use the results of the Pilot Study, and possibly information obtained during subsequent investigations, to evaluate whether up-graded UST systems that handle MtBE are protective of groundwater quality, and ultimately drinking water. This Study and other District groundwater vulnerability assessments are critical in formulating a plan to protect drinking water supplies into the future.

With cooperation from the site owner and operator and the assistance of the San Jose Fire Department, LFR Levine·Fricke completed a file review, site inspection, and soil-gas, soil, and groundwater sampling at this site on behalf of the District. LFR's subcontractor, Integrated Engineering Services, completed a UST inspection at this site. This report provides a brief summary of investigation findings, and site-specific data in tables, figures, and appendices. This Site Report is appended to the Summary Report for the Study.

LFR
LEVINE•FRICKE
1900 Powell Street, 12th Floor
Emeryville, California 94608-1827
(510) 652-4500/Fax (510) 652-2246

SUMMARY OF FINDINGS

SITE DESCRIPTION

Figure 1 illustrates the site location. Site geology consists primarily of sandy silts and clays to approximately 40 to 50 feet below the ground surface (bgs) underlain by a gravel layer to approximately 60 feet bgs. A sandy gravel, 70 to 130 feet thick, was encountered at a few of the locations at approximately 28 feet bgs. The shallowest depth to water measured was approximately 63 feet bgs (November 1998).

SYSTEM DESCRIPTION

The UST system at the site consists of two 12,000-gallon double-walled gasoline USTs constructed of steel clad with fiberglass reinforced plastic [FRP] with double-walled FRP piping. The UST system utilizes both mechanical and automatic line leak detection for piping and manual inventory reconciliation and continuous interstitial monitoring for the USTs.

RESULTS

MtBE was detected in soil-gas, soil and groundwater at this Site. MtBE was detected in 1 of 16 soil-gas samples at a very low concentration (0.011 μg/l). MtBE was detected in 3 of the 12 soil samples collected at concentrations ranging from 6.9 μg/kg to 11 μg/kg. MtBE was detected in both groundwater samples collected at concentrations of 9.2 μg/l and 6,700 μg/l. Toluene was detected at a low concentration (2.8 μg/l) in one soil-gas sample and 6 soil samples (up to 11 μg/kg); xylenes were detected in one soil sample (5.7 μg/l). Benzene (0.51 μg/l), toluene (1.2 μg/l), ethylbenzene (0.92 μg/l), and xylenes (1.5 μg/l) were reported above laboratory detection limits in 1 groundwater sample.

SITE SELECTION CRITERIA MET

1998 upgrade compliant?	Yes
On SCVWD fuel leak database?	No
Status:	Not applicable
Distance from LUST site:	Greater than 250 feet
Distance to water supply well:	Less than 2000 feet
Access granted?	Yes
SCVWD approved?	Yes

FILE REVIEW SUMMARY

Number of tanks:	2
Reported release?	No
Release date:	Not applicable
Fuel released:	Not applicable
Location:	Not applicable
Quantity (gallons):	Not applicable
Data available:	Not applicable
Comments:	

SITE VISIT - UST SYSTEM INFORMATION

Precision tank tightness records available?	Yes
Date of last test:	Within 6 months of the inspection
Method of tank testing:	Automatic tank guaging
Tank leak rate (gallons/hour):	<0.2
UST overfill prevention system present?	Yes
Type of system:	Both overfill limiter and drop tube/check-valve
Automatic shut-off?	Yes
System operational?	Yes
Overfill containment (gallons):	15
Drop tube equipped with striker plate?	Yes
Under island containment present?	Yes
Under island containment monitoring:	None
Quick release dispenser hoses?	Yes
Alarm system functional?	Yes
Type:	Shut-off
Vents:	
Vent type:	Dedicated
Vent piping:	Single walled
Condition of UST turbine sump:	Good
Condition of UST flex line sump:	Good
Vapor recovery system:	Vapor assisted
Years of operation since upgrade:	Approximately 3 years
Years of operation as fueling facility:	Approximately 33 years
Estimated throughput:	Less than 100,000 gallons per month
Monitoring systems operational?	Yes
Systems operations, comment:	TLS 350
Tank annular space monitoring:	Liquid probe
Overfill containment monitoring system:	Liquid probe
Piping leak detection:	Combined (pressure line leak detection and liquid probe)
Is system monitored?	Yes
Station inventory records available?	Yes
Records up to date?	Yes
Records complete?	Yes
Supplier log reviewed?	Yes
Spill log reviewed?	Yes
Spill log comments:	Oil in containment sump not on log
Personnel training:	Yes

Comments:

While the Form B completed on 3/95 indicated other tank leak detection methods, only those noted above were observed in the field.

SITE INSPECTION

Condition of apron around pumps:	Good
Evidence of recent paving/regrading?	No
Location of recent paving/regrading:	Not applicable
Description of surface drainage?	To northwest of site
Direct route for surface spills to subsurface?	Possible
Description of route to subsurface:	Storm drains
Other potential petroleum sources?	Yes
Description of other petroleum sources:	Service bay; station does more service business than fueling
Nearby surface water?	No
Name of surface water:	Not applicable
Type of surface water:	Not applicable

Comments:

Dealer did not seem real familiar with UST/monitoring system.

UST SYSTEM DATA FROM FORM B COLLECTED DURING FILE REVIEWS - TANK ID # 3364-1

Date installed:	1985
Tank capacity (gallons):	12,000
Tank contents:	Regular unleaded
Tank construction:	
Type of system:	Double wall
Tank material (primary tank):	Steel-clad with fiberglass reinforced plastic
Lining compatible with 100% methanol:	No
Exterior corrosion protection:	Fiberglass reinforced plastic
Date spill containment installed:	1985
Date overfill protection equipment installed:	Not noted
Drop tube:	Not noted
Striker plate:	Not noted
Dispenser containment:	Not noted
Piping information:	
System type:	Pressure, underground
Construction:	Double wall, underground
Material and corrosion protection:	Fiberglass pipe, underground
Leak detection:	Mechanical line leak detection Line tightness testing
Tank leak detection?	Visual check Manual inventory reconciliation Vadose zone monitoring Automatic tank gauging

Ground water monitoring
Annual tank testing

UST SYSTEM DATA FROM FORM B COLLECTED DURING FILE REVIEWS - TANK ID # 3364-2

Date installed:	1985
Tank capacity (gallons):	12,000
Tank contents:	Premium unleaded
Tank construction:	
Type of system:	Double wall
Tank material (primary tank):	Steel-clad with fiberglass reinforced plastic
Lining compatible with 100% methanol:	No
Exterior corrosion protection:	Fiberglass reinforced plastic
Date spill containment installed:	1985
Date overfill protection equipment installed:	Not noted
Drop tube:	Not noted
Striker plate:	Not noted
Dispenser containment:	Not noted
Piping information:	
System type:	Pressure, underground
Construction:	Double wall, underground
Material and corrosion protection:	Fiberglass pipe, underground
Leak detection:	Mechanical line leak detection Line tightness testing
Tank leak detection?	Visual check Manual inventory reconciliation Vadose zone monitoring Automatic tank gauging Ground water monitoring Annual tank testing

Table 1
Summary of Chemical Analysis Results for Soil-Gas Samples - Site #073
Santa Clara Valley Water District

Location	Date Sampled	Depth (ft bgs)	Methyl Tertiary Butyl Ether (MTBE) ug/L	TPH as Gasoline (TPHg) ug/L	Benzene (B) ug/L	Toluene (T) ug/L	Ethyl Benzene (E) ug/L	meta/para-Xylenes (m/p-X) ug/L	ortho-Xylene (o-X) ug/L	Notes
073-SG-01	11/13/98	6	<5	110	<1	<1	<1	<1	<1	
		12	<5	120	<1	<1	<1	<1	<1	
		19	<5	170	<1	<1	<1	<1	<1	
		28	<5	<100	<1	<1	<1	<1	<1	
073-SG-02	11/13/98	6	<5	<100	<1	2.8	<1	<1	<1	
		12	<5	<100	<1	<1	<1	<1	<1	
073-SG-03	11/13/98	6	<5	<100	<1	<1	<1	<1	<1	
		12	<5	<100	<1	<1	<1	<1	<1	
073-SG-03-DUP		12	<5	<100	<1	<1	<1	<1	<1	
073-SG-03-SPL		12	0.011 J	NA	0.0091	0.016	0.0033 J	0.011 J	0.0044 J	(a)
073-SG-04	11/13/98	6	<5	<100	<1	<1	<1	<1	<1	
		12	<5	<100	<1	<1	<1	<1	<1	
073-SG-05	11/13/98	6	<5	<100	<1	<1	<1	<1	<1	
		12	<5	<100	<1	<1	<1	<1	<1	
073-SG-06	11/13/98	6	<5	<100	<1	<1	<1	<1	<1	
		12	<5	<100	<1	<1	<1	<1	<1	

Table proofed by CLC

Notes:

(a) Other analytes detected: Ethanol (0.018 ug/L)

All primary and field duplicate (-DUP) samples were analyzed on site by InterPhase, of Los Angeles, CA using EPA Method 8020 for MTBE and BTEX, and Modified EPA Method 8015 for TPHg.

Additional field duplicate samples (-SPL) were analyzed off site by Air Toxics, Ltd., Folsom, CA using EPA Method TO-14.

ft bgs = feet below ground surface

NA = Not analyzed

TPH = total petroleum hydrocarbons

ug/L = micrograms per liter

Data Qualifiers (if shown on table):

E = Exceeds the calibration range

I = Interference by the sample matrix

J = Estimated value

UJ = Not detected at the estimated reporting limit shown

T[illegible]e 2

Summary of Chemical Analysis Results for Soil Samples - Site #073

Santa Clara Valley Water District

Location	Date Sampled	Depth (ft bgs)	Methyl Tertiary Butyl Ether (MTBE) ug/Kg	TPH as Gasoline (TPHg) mg/Kg	Benzene (B) ug/Kg	Toluene (T) ug/Kg	Ethyl Benzene (E) ug/Kg	meta/para-Xylenes (m/p-X) ug/Kg	ortho-Xylene (o-X) ug/Kg	Di-isopropyl Ether (DIPE) ug/Kg	Ethyl Tertiary Butyl Ether (ETBE) ug/Kg	Tertiary Amyl Methyl Ether (TAME) ug/Kg	Tertiary Butyl Alcohol (TBA) ug/Kg
073-BH-01	11/23/98	7.5-8.0	<5	<1	<5	7.1	<5	<5	<5	<20	<20	<20	<200
		11.0-11.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		23.0-23.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
073-BH-02	11/23/98	7.0-7.5	<5	<1	<5	5.6	<5	<5	<5	<20	<20	<20	<200
		11.0-11.5	11	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		22.0-22.5	<5	<1	<5	8.6	<5	<5	<5	<20	<20	<20	<200
073-BH-03	11/20/98	7.5	11	<1	<5	5.2	<5	5.7	<5	<20	<20	<20	<200
		15.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		19.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
073-BH-04	11/20/98	9.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		16.0	<5	<1	<5	5	<5	<5	<5	<20	<20	<20	<200
		25.0	6.9	<1	<5	11	<5	<5	<5	<20	<20	<20	<200

Table proofed by CLC.

Notes:

All samples were analyzed by Alpha Analytical, Inc. of Sparks, NV. using EPA Method 8260 for MTBE, BTEX, DIPE, ETBE, TAME, and TBA, and Modified EPA Method 8015 for TPHg.

ft bgs = feet below ground surface

mg/Kg = milligrams per kilogram

TPH = total petroleum hydrocarbons

ug/Kg = micrograms per kilogram

Data Qualifiers (if shown on table):

J = Estimated value

UJ =Not detected at the estimated reporting limit shown

Table 3
Summary of Chemical Analysis Results for Groundwater Samples - Site # 073
Santa Clara Valley Water District

Location	Date Sampled	Depth (ft bgs)	Methyl Tertiary Butyl Ether (MTBE) ug/L	TPH as Gasoline (TPHg) mg/L	Benzene (B) ug/L	Toluene (T) ug/L	Ethyl Benzene (E) ug/L	meta/para-Xylenes (m/p-X) ug/L	ortho-Xylene (o-X) ug/L	Di-isopropyl Ether (DIPE) ug/L	Ethyl Tertiary Butyl Ether (ETBE) ug/L	Tertiary Amyl Methyl Ether (TAME) ug/L	Tertiary Butyl Alcohol (TBA) ug/L
073-BH-01	11/23/98	60.0-70.0	6300	<5	<20	<20	<20	<20	<20	<40	<40	<40	<400
073-BH-01-DUP		60.0-70.0	6700	<5	<20	<20	<20	<20	<20	<40	<40	<40	<400
073-BH-04	11/20/98	67.0	9.2	<0.05	0.51	1.2	0.92	1.5	<0.5	<1	<1	<1	<10

Table proofed by CLC.

Notes:

All primary and field duplicate (-DUP) samples were analyzed by Alpha Analytical, Inc. of Sparks, NV, using EPA Method 8260 for MTBE, BTEX, DIPE, ETBE, TAME, and TBA, and Modified EPA Method 8015 for TPHg.

ft bgs = feet below ground surface
mg/L = milligrams per liter
TPH = total petroleum hydrocarbons
ug/L = micrograms per liter

Data Qualifiers (if shown on table):

J = Estimated value
UJ =Not detected at the estimated reporting limit shown

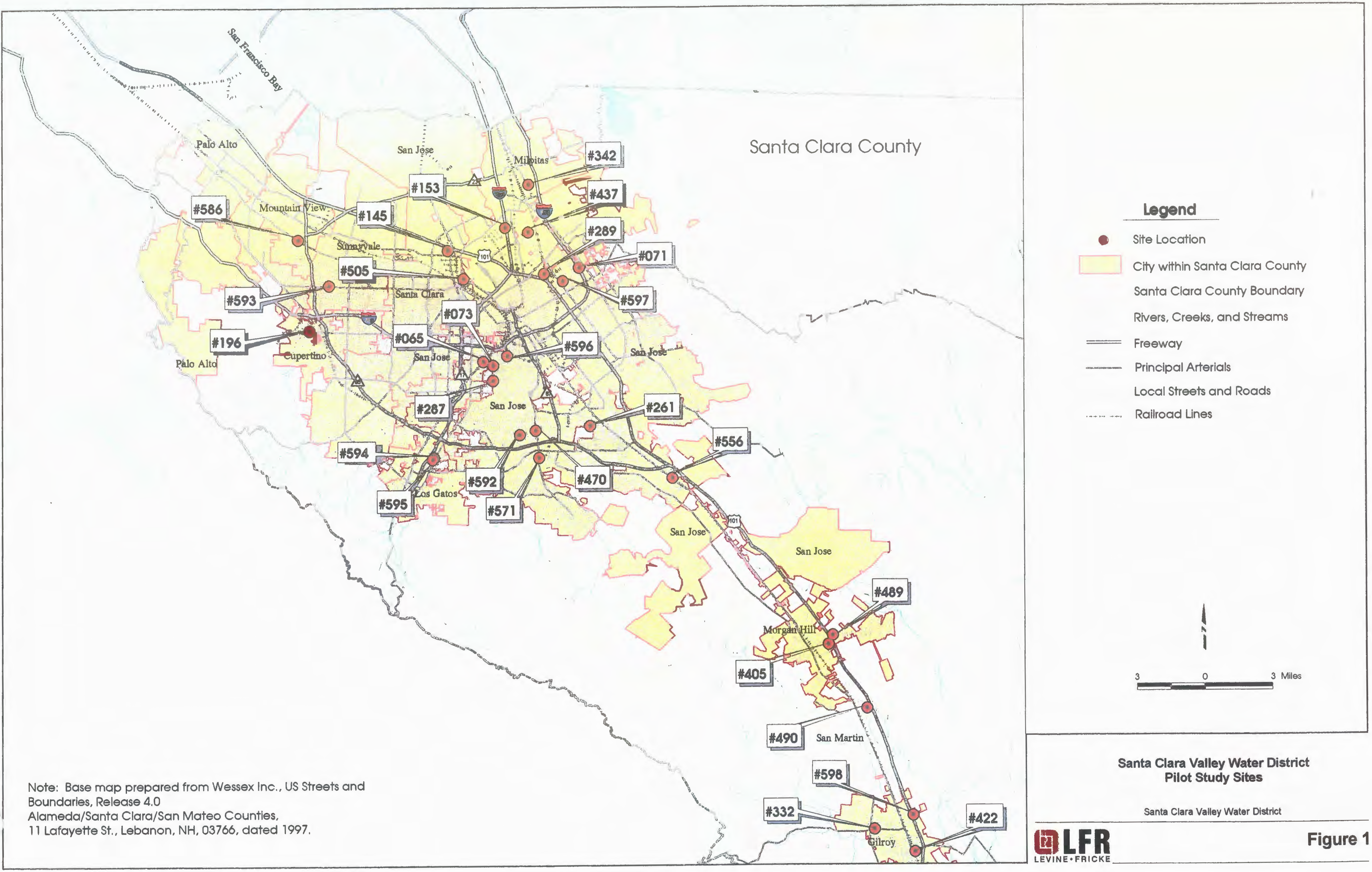
Table 4
Summary of Physical Parameters for Soil Samples - Site #073
Santa Clara Valley Water District

Location	Depth (ft bgs)	Visual Description	Total Organic Carbon (percent)	Moisture Content (percent)	Wet Weight (lbs/cu.ft.)	Dry Unit Weight (lbs/cu.ft.)	Porosity (percent)
073-BH-02	11.5 - 12.0	Brown fine sandy silty clay	0.20	22.88	125.5	102.1	39.39
	22.5 - 23.0	Brown fine sandy silty clay	0.09	21.97	123.1	100.9	40.10
073-BH-03	43.0 - 43.5	Mottled gray brown fine sandy silty clay	0.06	19.14	121.4	101.9	39.51
073-BH-04	15.5 - 16.0	Brown fine sandy silty clay	0.19	19.98	119.1	99.3	41.05
	19.0 - 19.5	Brown sandy clay with gravel	0.12	14.87	129.6	112.8	33.04
	58.0 - 58.5	Bluish gray gravelly clayey sand	0.06	4.70	NA	NA	NA
	63.0 - 63.5	Olive brown gravelly clayey sand	0.05	11.61	143.4	128.5	23.71

Table proofed by CLC.

Notes:

Specific gravity values were 2.70 for all samples analyzed.
Total organic carbon analyses were performed by Curtis and Tompkins Analytical Laboratories, Berkeley, CA.
All other analyses were performed by URS Greiner Woodward Clyde, Oakland, CA.
ft bgs = feet below ground surface
lbs/cu.ft. = pounds per cubic foot
NA = Not analyzed



Note: Base map prepared from Wessex Inc., US Streets and Boundaries, Release 4.0
Alameda/Santa Clara/San Mateo Counties,
11 Lafayette St., Lebanon, NH, 03766, dated 1997.

Santa Clara Valley Water District
Pilot Study Sites

Santa Clara Valley Water District

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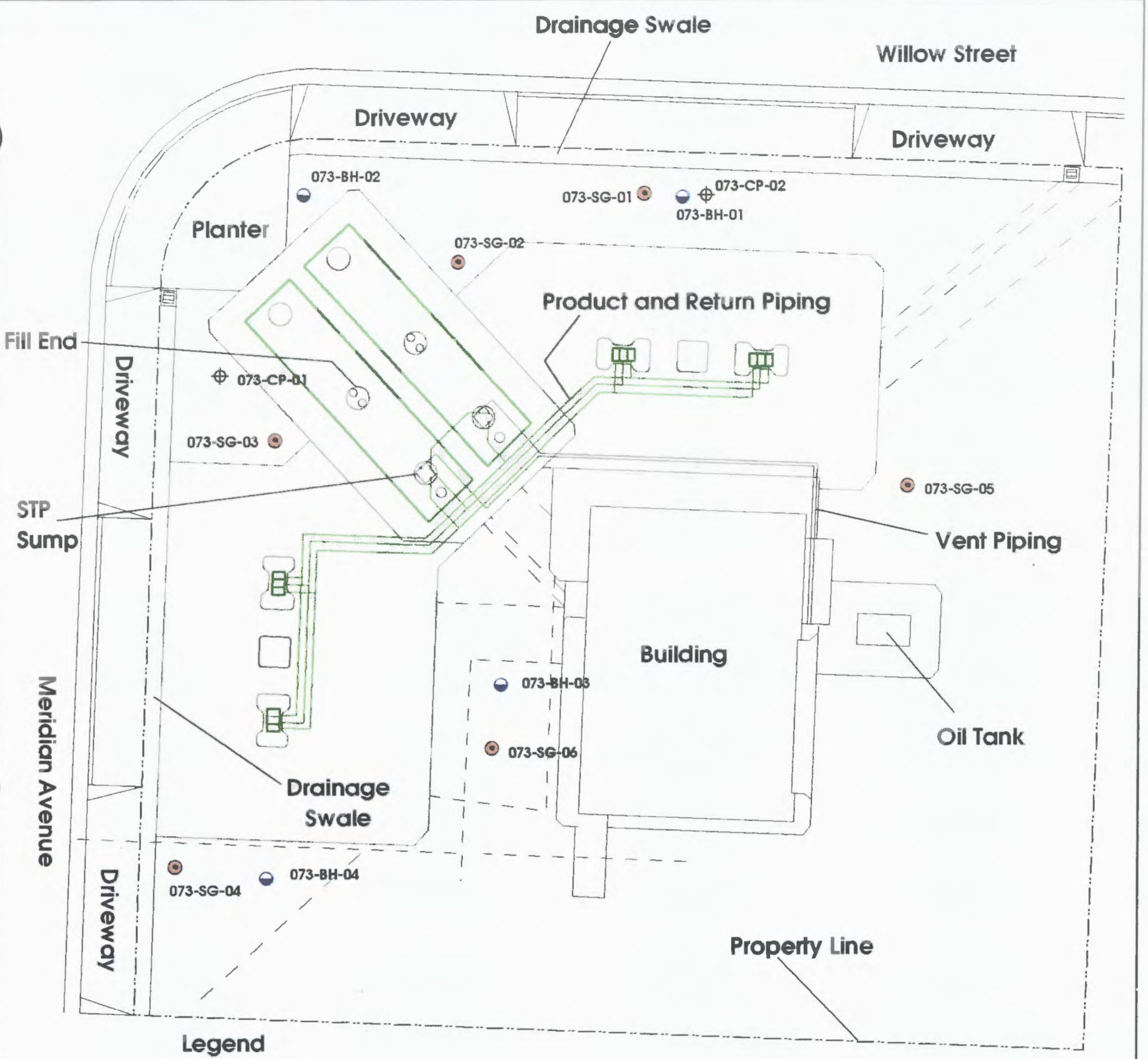
Figure 1



Legend

- Gasoline underground storage tank, product and return piping, and dispenser
- ○ UST access port
- Concrete slab
- - - - Underground Utilities
- ▤ Storm Drain Catch Basin
- ● Soil and groundwater sampling point
- ● Soil-gas sampling point
- ⊕ Cone-penetrometer test point

STP - Submersible Turbine Pump

Note: Base map prepared from Site Plan, Sheet A-1, S.S. NO. 3364, 1104 Meridian Avenue, San Jose, CA, Unocal 76, by Robert H. Lee & Associates, Inc., Sacramento, CA, dated 3/20/95.

Site #073

Site Plan

Santa Clara Valley Water District

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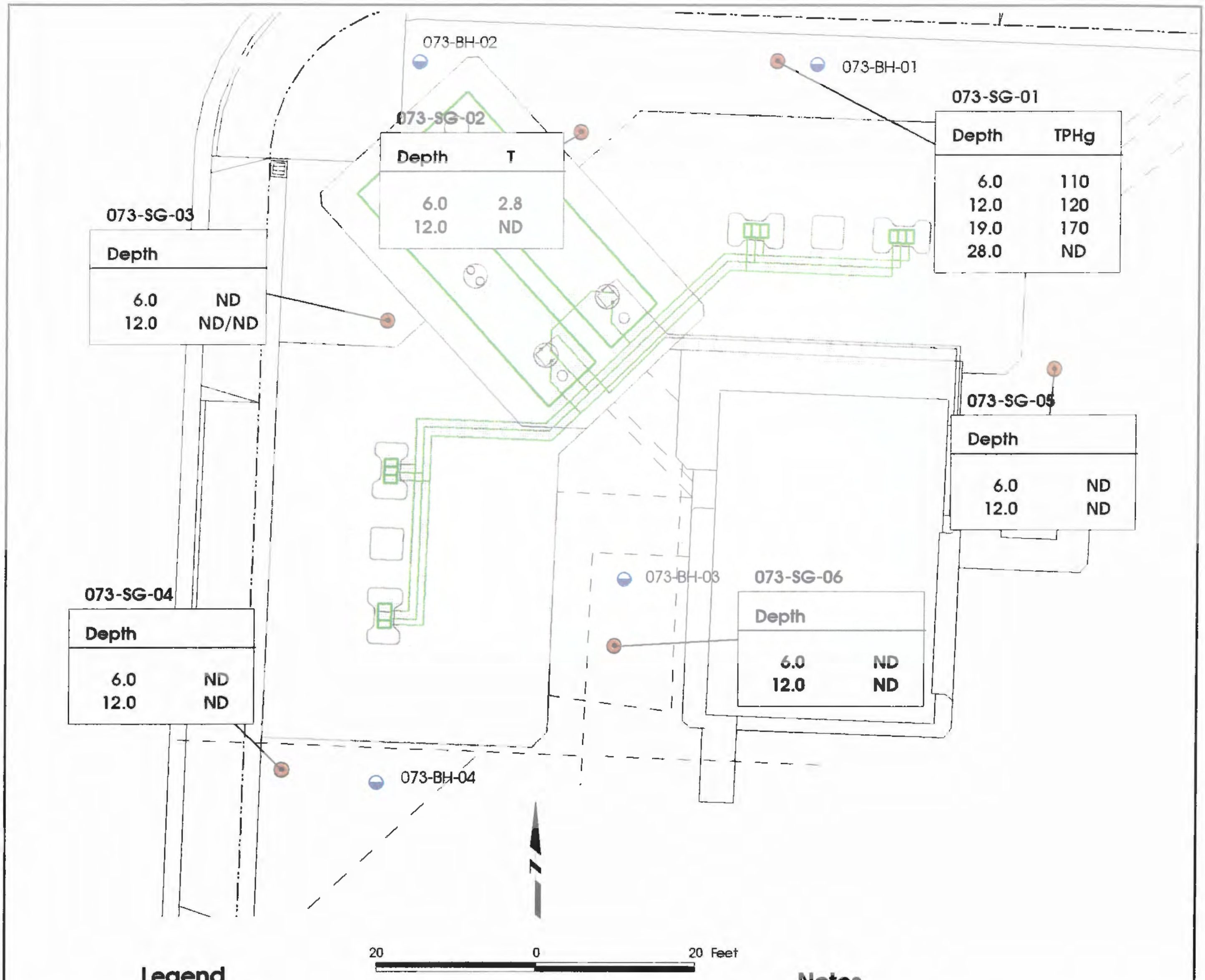
Figure 2



Legend

● Soil-gas sampling location

◒ Soil and groundwater sampling location

The following represents a hypothetical sampling point and defines the characters associated with that point:

Sample Location ——— ###-SG-01

Depth	m/p-X	T
5.0	2.5	4.1
12.0	1.0/1.2	ND/ND

Depth in feet

Result of primary analysis

Result of duplicate analysis when applicable

🟩 Gasoline underground storage tank, product and return piping, and dispenser

O UST access port

☐ Concrete slab

- - - - Underground utilities

▤ Storm Drain Catch Basin

See Figure 2 for description of site features and origin of base map.

Notes

Concentrations of analytes detected are presented; analytes not detected are not presented or are presented as ND (not detected). MTBE and BTEX were analyzed using EPA Method 8020 and TPHg was analyzed using Modified EPA Method 8015.

Results in micrograms/liter (ug/L)
RL = Reporting Limit

Each sample was analyzed for the following:

MTBE = Methyl Tertiary Butyl Ether (RL = 5 ug/L)
TPHg = Total Petroleum Hydrocarbons as Gasoline (RL = 100 ug/L)
B = Benzene (RL = 1 ug/L)
T = Toluene (RL = 1 ug/L)
E = Ethyl Benzene (RL = 1 ug/L)
m/p-X = meta/para-Xylenes (RL = 1 ug/L)
o-X = ortho-Xylene (RL = 1 ug/L)

Site #073

Summary of Chemical Analysis Results for Soil-Gas Samples

Santa Clara Valley Water District

LFR
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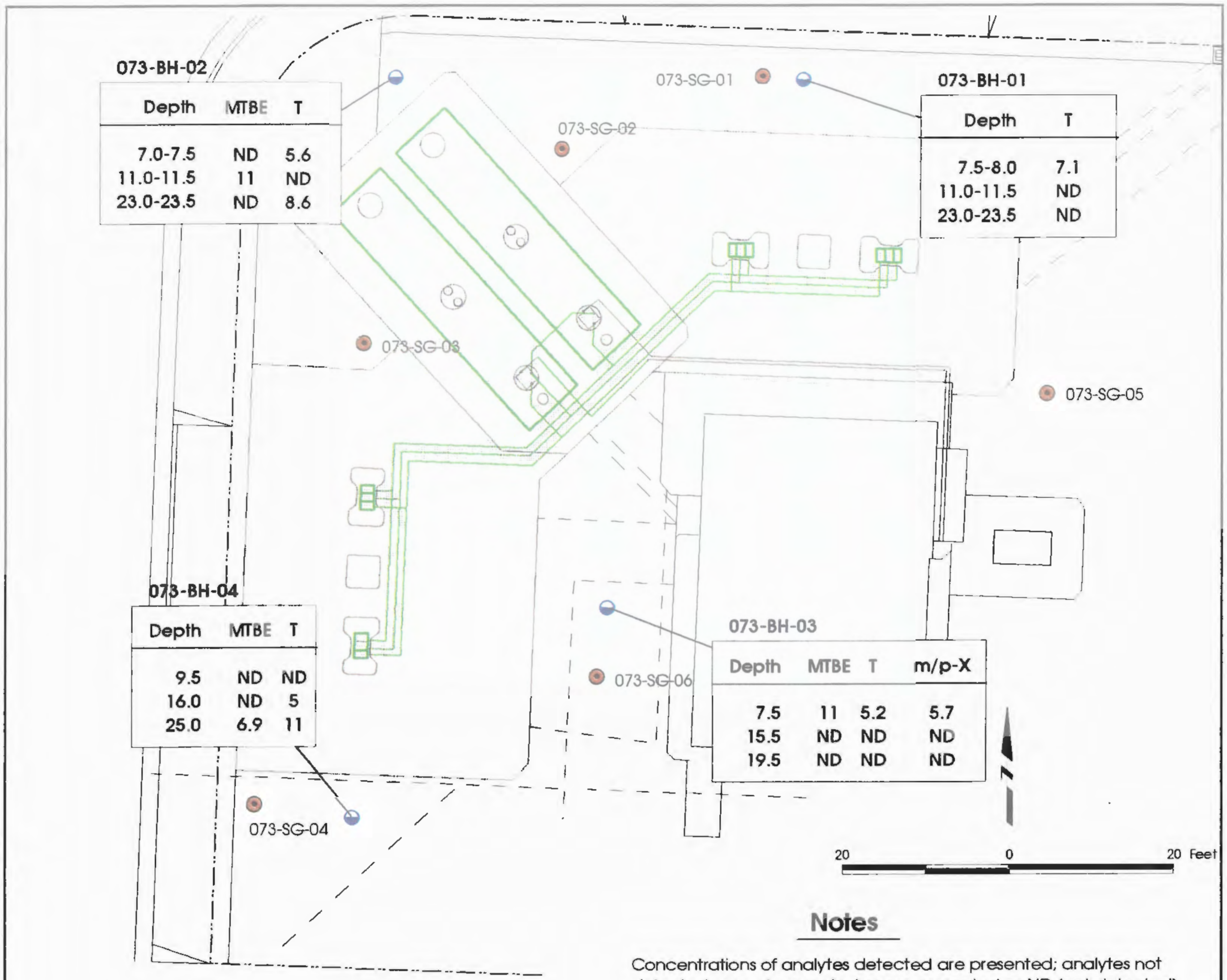
Figure 3

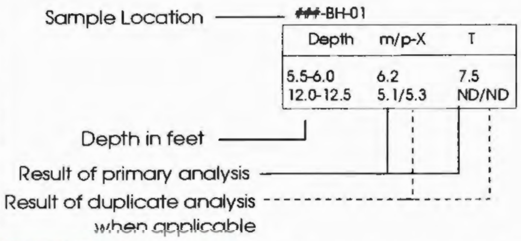


Legend

◒ Soil and groundwater sampling location

● Soil-gas sampling location

The following represents a hypothetical sampling point and defines the characters associated with that point:



🟩 Gasoline underground storage tank, product and return piping, and dispenser

○ UST access port

Concrete slab

▤ Storm Drain Catch Basin

- - - Underground utilities

See Figure 2 for description of site features and origin of base map.

Notes

Concentrations of analytes detected are presented; analytes not detected are not presented or are presented as ND (not detected). TPHg was analyzed using Modified EPA Method 8015, all other analytes were analyzed using EPA Method 8260.

Results in micrograms/kilogram (ug/Kg) for all compounds except TPHg which is presented in milligrams/kilogram (mg/Kg).

RL = Reporting Limit

Each sample was analyzed for the following:

MTBE = Methyl Tertiary Butyl Ether (RL = 5 ug/Kg)
TPHg = Total Petroleum Hydrocarbons as Gasoline (RL = 1 mg/Kg)
B = Benzene (RL = 5 ug/Kg)
T = Toluene (RL = 5 ug/Kg)
E = Ethyl Benzene (RL = 5 ug/Kg)
m/p-X = meta/para-Xylenes (RL = 5 ug/Kg)
o-X = ortho-Xylene (RL = 5 ug/Kg)
DIPE = Di-isopropyl Ether (RL = 20 ug/Kg)
ETBE = Ethyl Tertiary Butyl Ether (RL = 20 ug/Kg)
TAME = Tertiary Amyl Methyl Ether (RL = 20 ug/Kg)
TBA = Tertiary Butyl Alcohol (RL = 200 ug/Kg)

Site #073

Summary of Chemical Analysis Results for Soil Samples

Santa Clara Valley Water District

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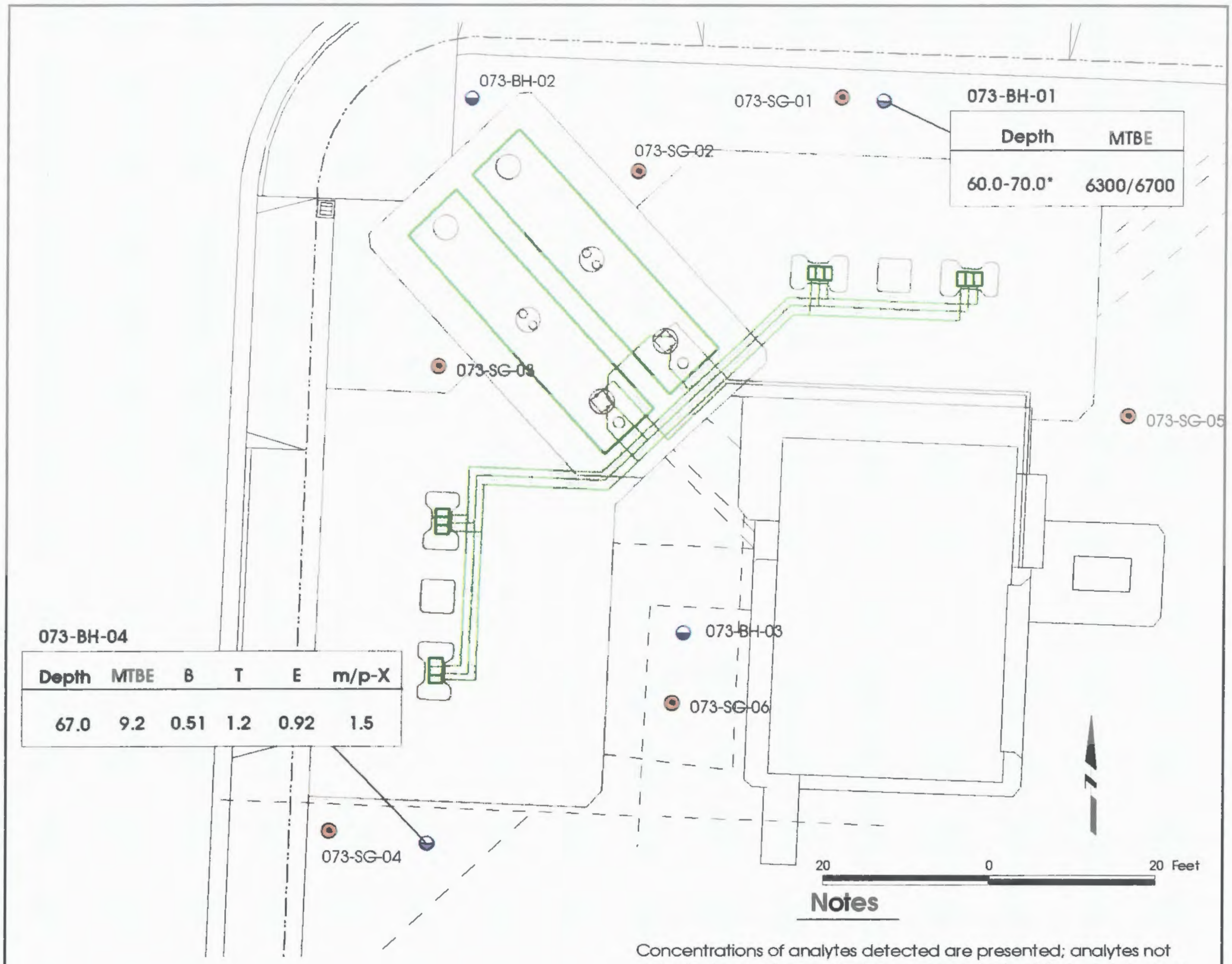
Figure 4



073-BH-01

Depth	MTBE
60.0-70.0*	6300/6700

073-BH-04

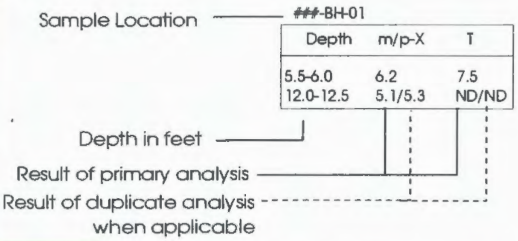
Depth	MTBE	B	T	E	m/p-X
67.0	9.2	0.51	1.2	0.92	1.5

Legend

◒ Soil and groundwater sampling location

◉ Soil-gas sampling location

The following represents a hypothetical sampling point and defines the characters associated with that point:


Sample Location
###-BH-01
Depth in feet
Result of primary analysis
Result of duplicate analysis when applicable

Depth	m/p-X	T
5.5-6.0	6.2	7.5
12.0-12.5	5.1/5.3	ND/ND

Gasoline underground storage tank, product and return piping, and dispenser

○ UST access port

Concrete slab

- - - Underground utilities

▤ Storm Drain Catch Basin

See Figure 2 for description of site features and origin of base map.

Notes

Concentrations of analytes detected are presented; analytes not detected are not presented or are presented as ND (not detected). TPHg was analyzed using Modified EPA Method 8015, all other analytes were analyzed using EPA Method 8260.

Results in micrograms/liter (ug/L) for all compounds except TPHg which is presented in milligrams/liter (mg/L).

RL = Reporting Limit

* Indicates elevated RL (see results table for reporting limits)

Each sample was analyzed for the following:

MTBE = Methyl Tertiary Butyl Ether (RL = 0.5 ug/L)
TPHg = Total Petroleum Hydrocarbons as Gasoline (RL = 0.05 mg/L)
B = Benzene (RL = 0.5 ug/L)
T = Toluene (RL = 0.5 ug/L)
E = Ethyl Benzene (RL = 0.5 ug/L)
m/p-X = meta/para-Xylenes (RL = 0.5 ug/L)
o-X = ortho-Xylene (RL = 0.5 ug/L)
DIPE = Di-isopropyl Ether (RL = 1 ug/L)
ETBE = Ethyl Tertiary Butyl Ether (RL = 1 ug/L)
TAME = Tertiary Amyl Methyl Ether (RL = 1 ug/L)
TBA = Tertiary Butyl Alcohol (RL = 10 ug/L)

Site #073

Summary of Chemical Analysis Results for Groundwater Samples

Santa Clara Valley Water District

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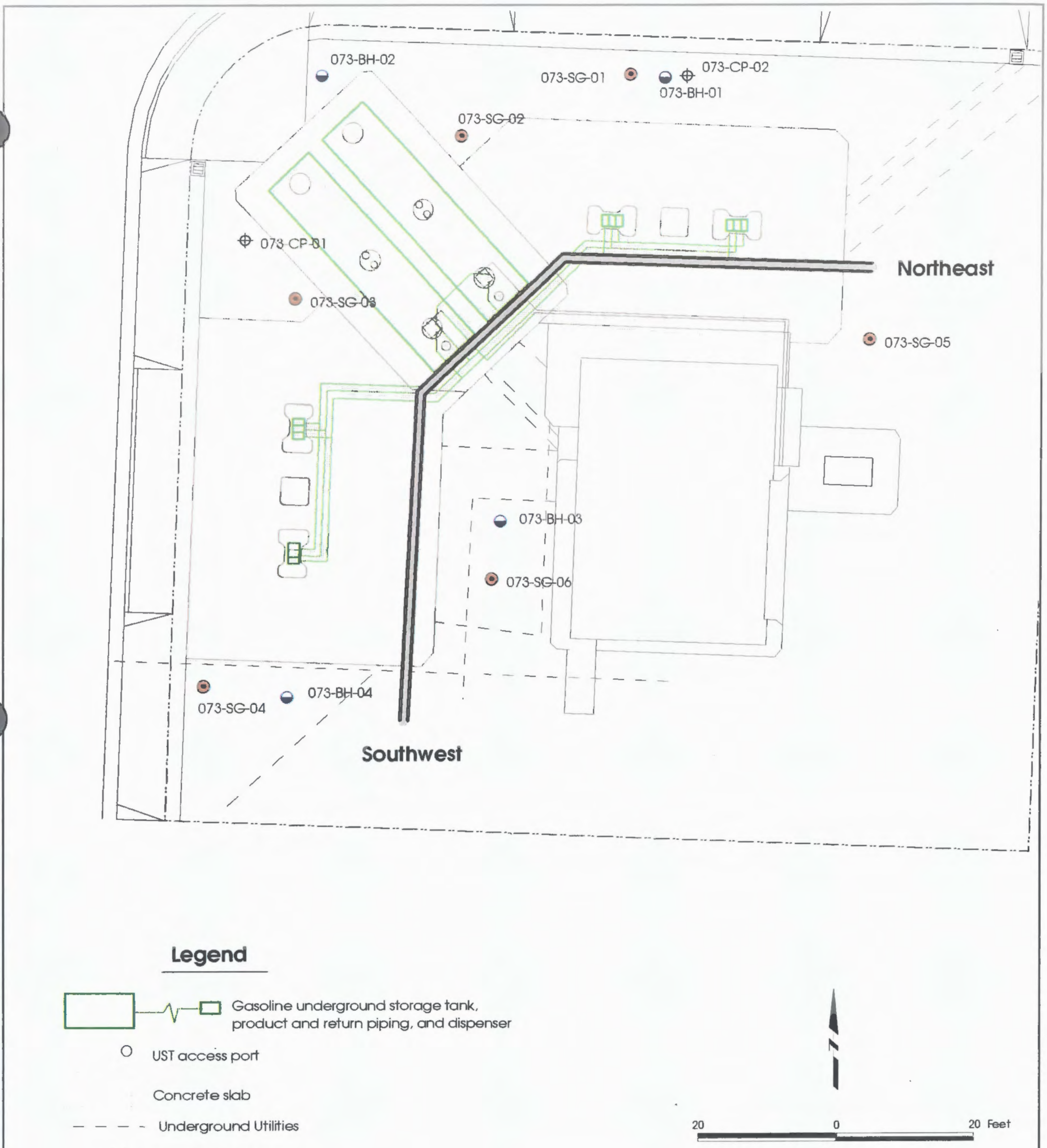
Figure 5

u:/scv[illegible]/gis/073.apr



Legend

- ▭ Gasoline underground storage tank, product and return piping, and dispenser
- ○ UST access port
- Concrete slab
- – – – – Underground Utilities
- ▤ Storm Drain Catch Basin
- ◒ Soil and groundwater sampling point
- ● Soil-gas sampling point
- ⊕ Cone-penetrometer test point

See Figure 2 for description of site features and origin of basemap.

Site #073

Site Plan Showing Orientation of Vertical Profile

Santa Clara Valley Water District

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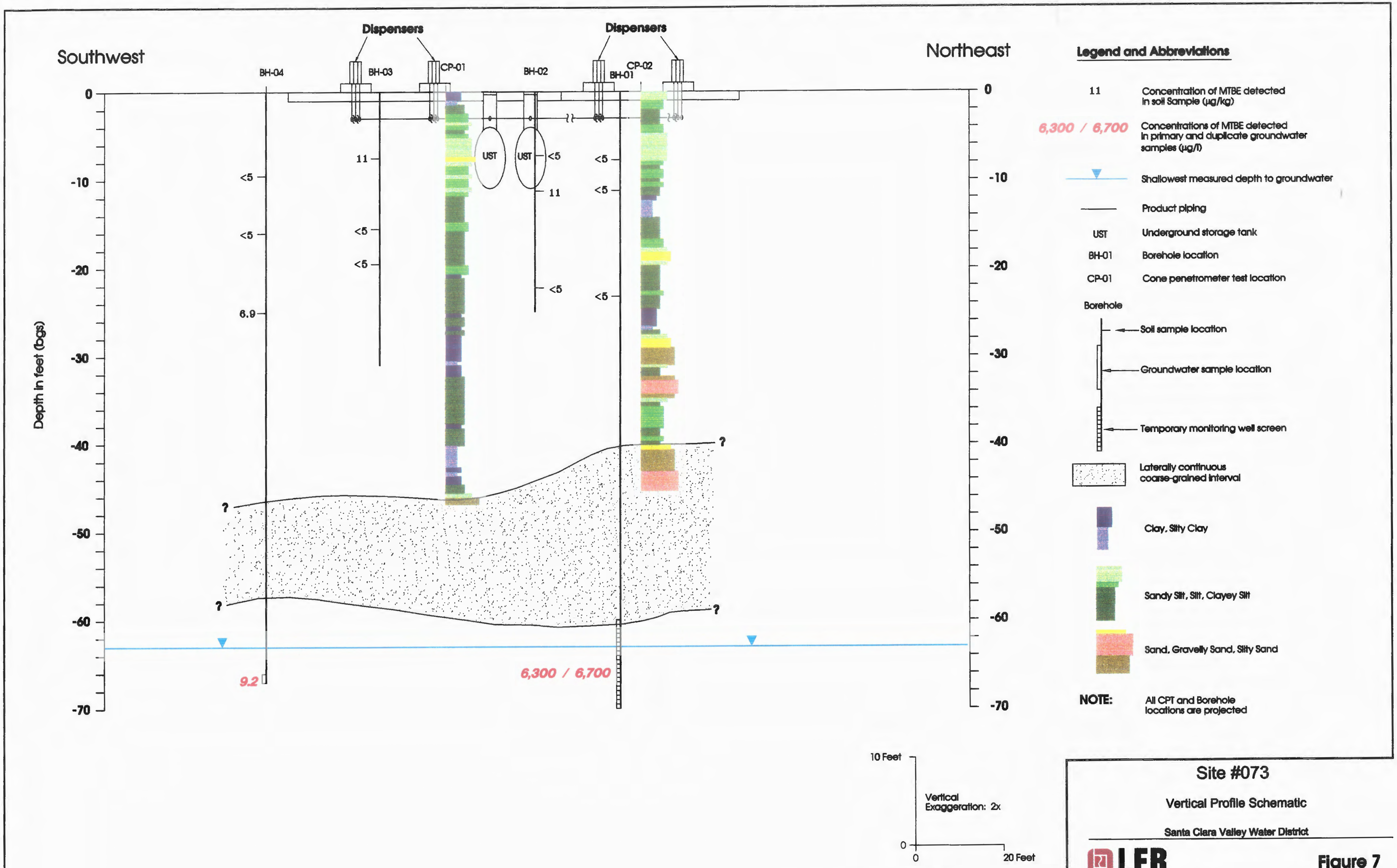
Figure 6


Southwest
Northeast
Dispensers
Dispensers
BH-04
BH-03
CP-01
BH-02
BH-01
CP-02
UST
UST
Depth in feet (bgs)
0
-10
-20
-30
-40
-50
-60
-70
11
<5
<5
<5
<5
<5
<5
11
<5
<5
<5
<5
6.9
?
?
?
?
9.2
6,300 / 6,700
Legend and Abbreviations
11 Concentration of MTBE detected in soil Sample (µg/kg)
6,300 / 6,700 Concentrations of MTBE detected in primary and duplicate groundwater samples (µg/l)
Shallowest measured depth to groundwater
Product piping
UST Underground storage tank
BH-01 Borehole location
CP-01 Cone penetrometer test location
Borehole
Soil sample location
Groundwater sample location
Temporary monitoring well screen
Laterally continuous coarse-grained interval
Clay, Silty Clay
Sandy Silt, Silt, Clayey Silt
Sand, Gravelly Sand, Silty Sand
NOTE: All CPT and Borehole locations are projected
10 Feet
0
0
20 Feet
Vertical Exaggeration: 2x

Site #073

Vertical Profile Schematic

Santa Clara Valley Water District

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Figure 7

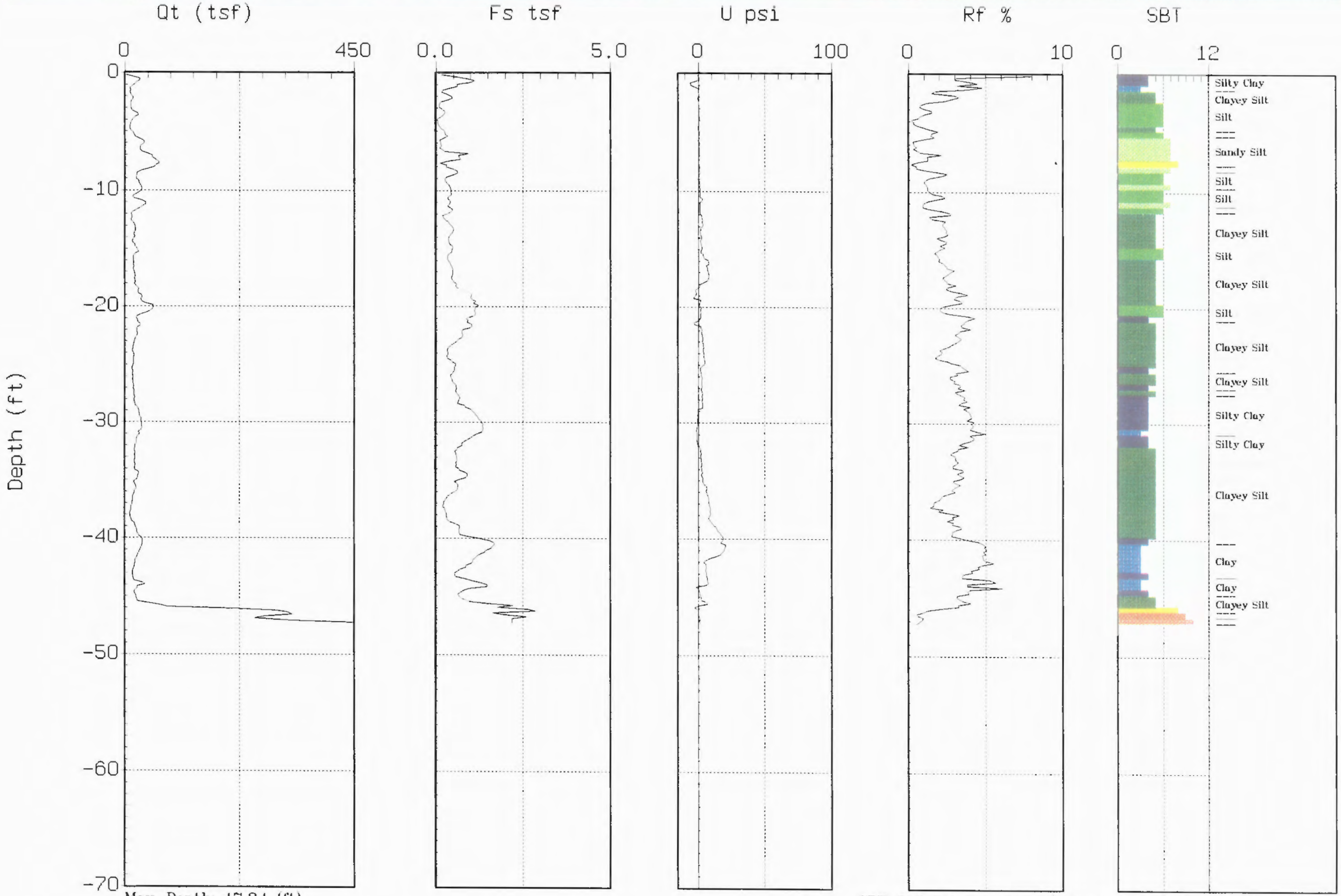
J:\ENGCAD\6730\CM\073.DWG 03/11/99 CM/505.PCP

GREGG

LFR LEVINE.FRICKE

Site: #073
Location : 073-CP-01

Geologist: Todd Miller
Date : 11:03:98 15:36



Max. Depth: 47.24 (ft)

Depth Inc.: 0.164 (ft)

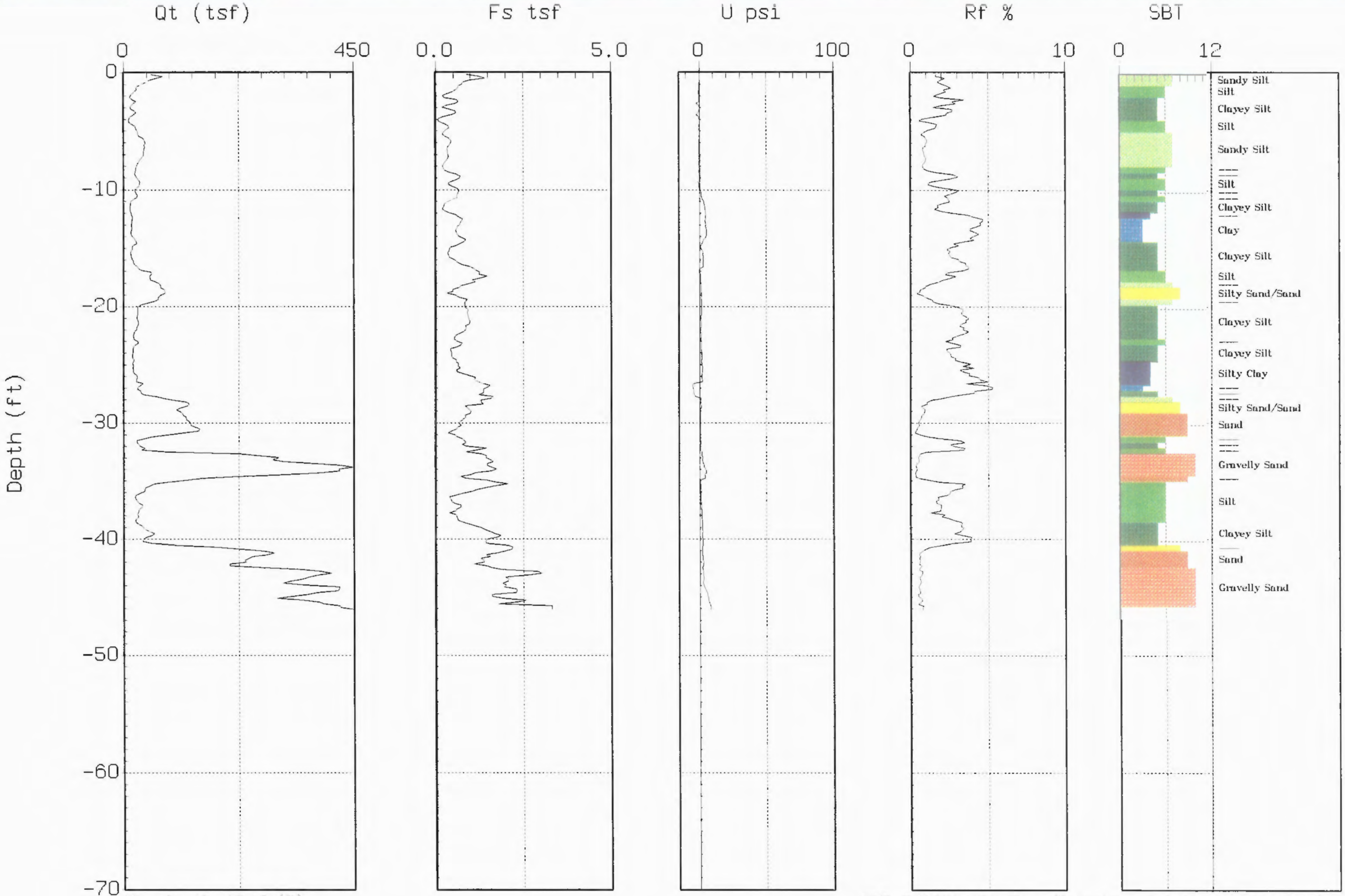
SBT: Soil Behavior Type (Robertson and Campanella 1988)

GREGG

LFR LEVINE.FRICKE

Site: 073-CP-02
Location : 073-CP-02

Geologist: Todd Miller
Date : 11:03:98 17:12



Max. Depth: 46.10 (ft)

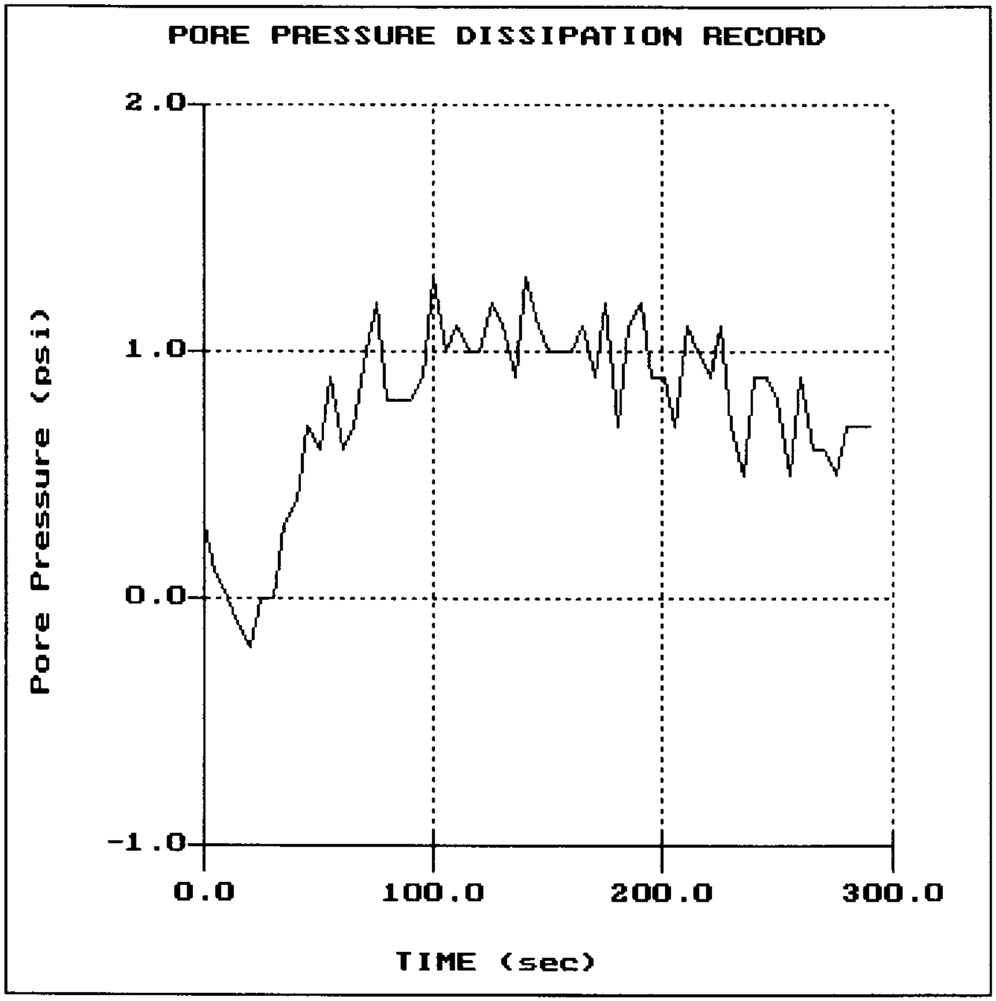
Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson and Campanella 1988)

LFR LEVINE FRICKE

Hole:073-CP-01
Location:#073

Cone:20 TON AD071
Date:11:03:98 15:36



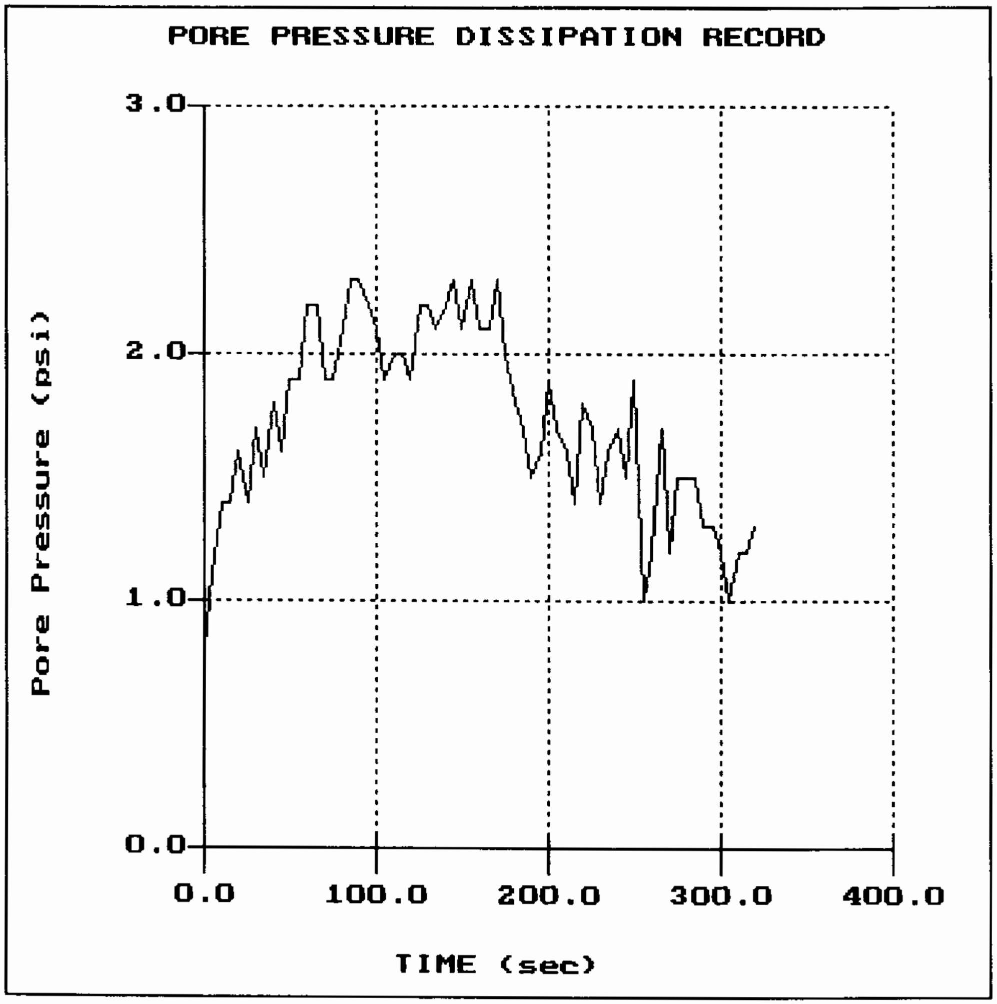
File: 108C07.PPR
Depth (m): 14.20
(ft): 46.59
Duration : 290.0s

LFR LEVINE FRICKE

Hole:073-CP-01
Location:#073

Cone:20 TON AD07
Date:11:03:98 15

File: 108C07.PPR
Depth (m): 14.40
(ft): 47.24
Duration : 320.0s

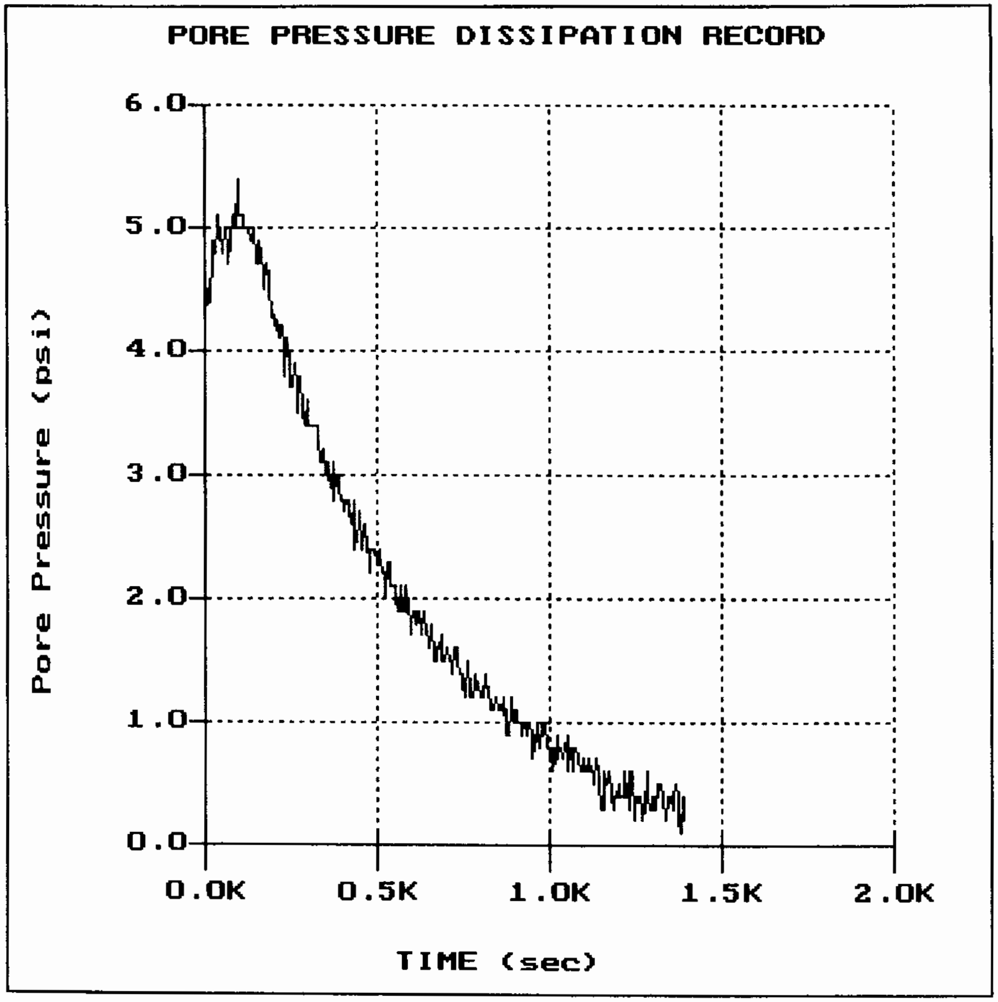

PORE PRESSURE DISSIPATION RECORD

LFR LEVINE FRICKE

Hole:073-CP-02
Location:#073

Cone:20 TON AD071
Date:11:03:98 17:12

File: 108C08.PPR
Depth (m): 10.60
(ft): 34.78
Duration : 1390.0s

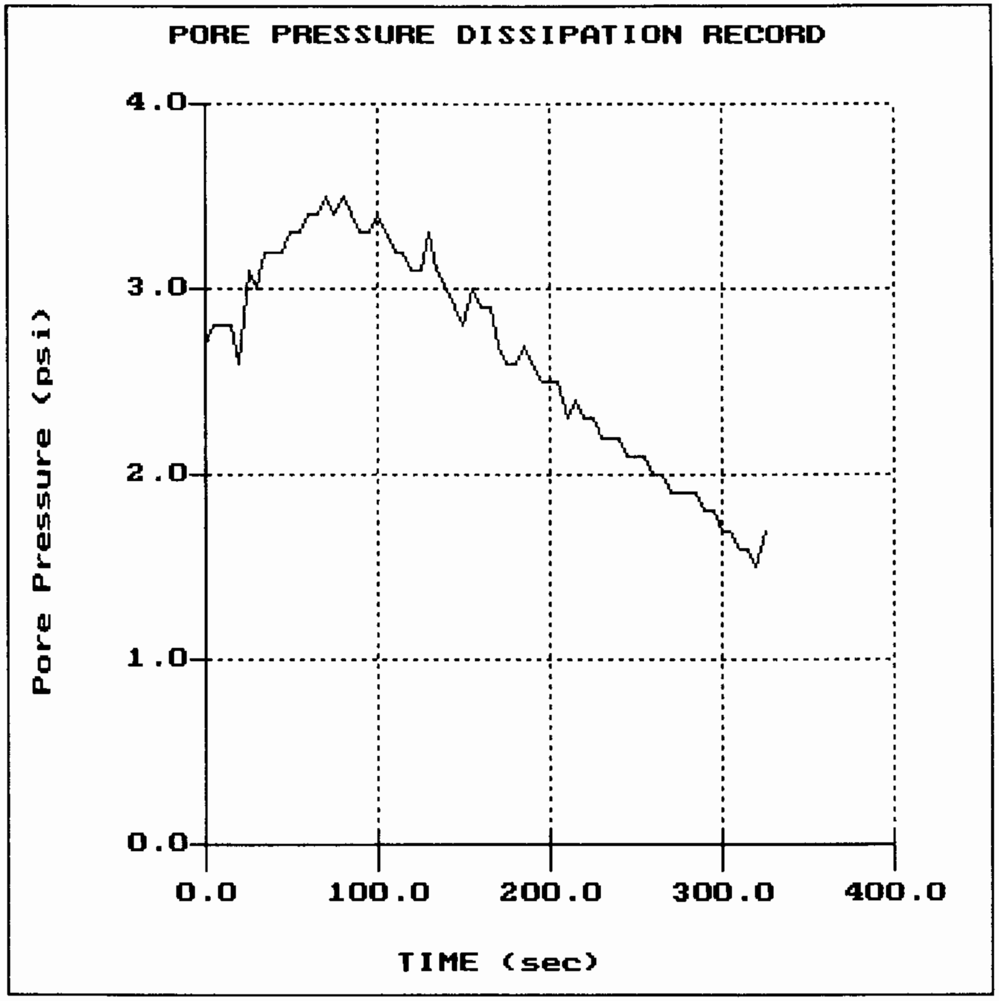


LFR LEVINE FRICKE

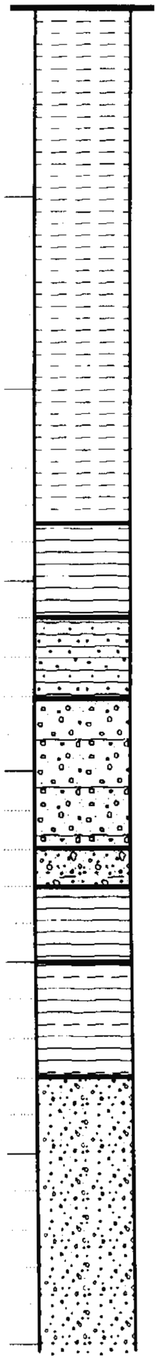
Hole:073-CP-02
Location:#073

Cone:20 TON AD071
Date:11:03:98 17:12

File: 108C08.PPR
Depth (m): 12.90
(ft): 42.32
Duration : 325.0s



SCVWD PILOT STUDY



Depth, feet	Water Level	PID Reading (ppm)	Lithologic Description
5		0.0	SILT (ML), light brown, slightly moist, medium stiff, trace sand and gravel.
		0.0	
10			Moist, soft, increase clay content.
		0.0	
15		0.0	CLAY (CL), light brown, moist, very soft, inclusions of highly weathered rock fragments (sandstone/claystone), possible carbon.
			GRAVELLY CLAY (CL), brown, moist, soft.
		0.0	
		Poor recovery	CLAYEY SANDY GRAVEL (GC), brown, moist, medium dense, well graded, subrounded gravel.
20			
		0.0	SILTY SANDY GRAVEL (GM), yellowish brown, slightly moist, very loose.
			CLAY (CL), brown, moist, high plasticity.
25			SILTY CLAY (CL), brown, moist, high plasticity, very soft.
		0.0	
			SANDY GRAVEL (GW), olive-brown, dry, dense, angular to subangular, well graded to less than 2 centimeters.
30		Poor recovery	
35			

Sample Interval

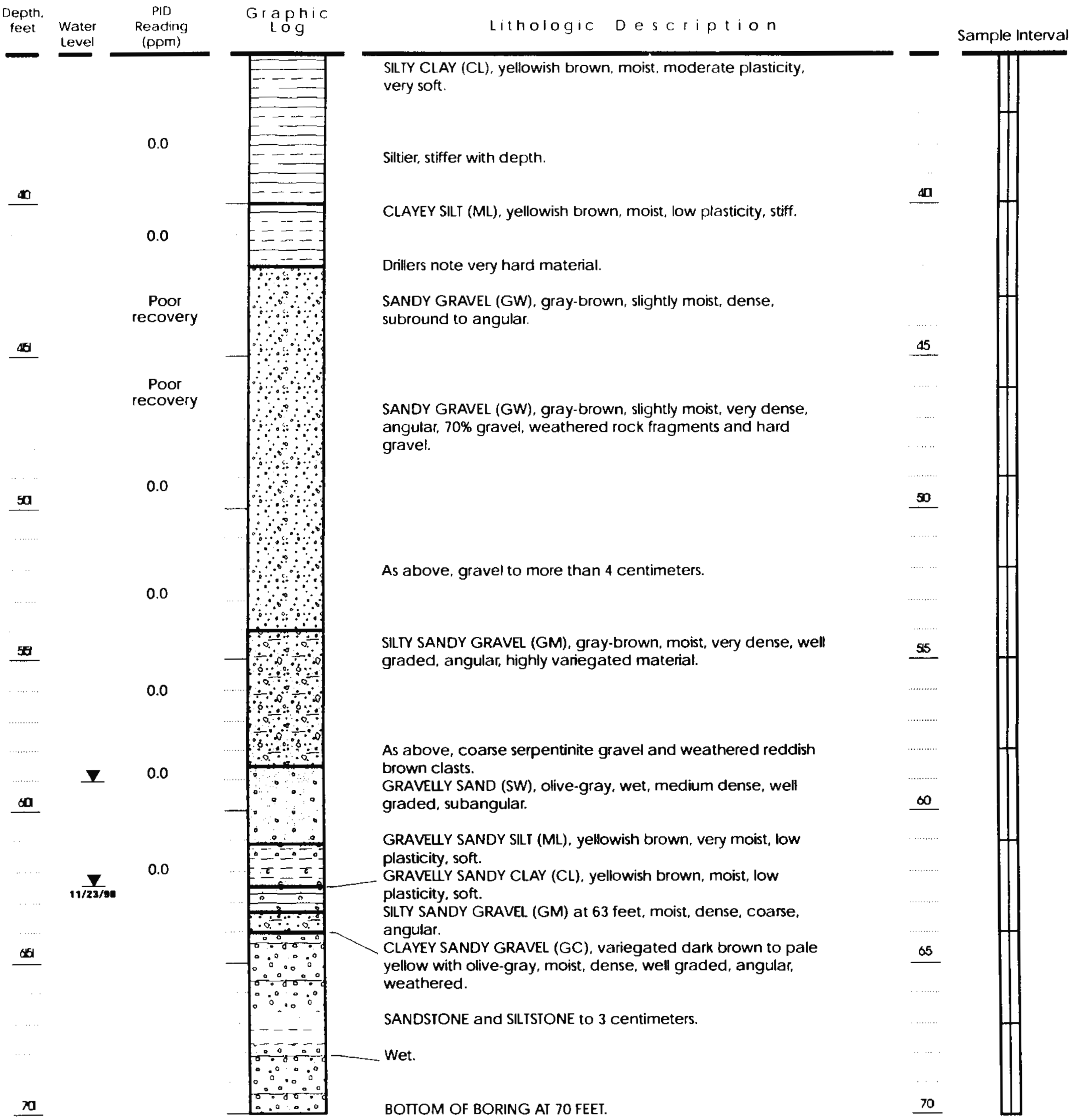
REGISTERED GEOLOGIST
JENNIFER J. BEATTY
No. 6650
Exp.
STATE OF CALIFORNIA

Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: November 23, 1998
LFR Geologist: Todd Miller, R.G., CH.G.

EXPLANATION

▤	Clay
☰	Silt
▒	Sand
▩	Gravel
▯	PID - Photoionization Detector
▼	Water level at time of drilling

SCVWD PILOT STUDY



SILTY CLAY (CL), yellowish brown, moist, moderate plasticity, very soft.

Siltier, stiffer with depth.

CLAYEY SILT (ML), yellowish brown, moist, low plasticity, stiff.

Drillers note very hard material.

SANDY GRAVEL (GW), gray-brown, slightly moist, dense, subround to angular.

SANDY GRAVEL (GW), gray-brown, slightly moist, very dense, angular, 70% gravel, weathered rock fragments and hard gravel.

As above, gravel to more than 4 centimeters.

SILTY SANDY GRAVEL (GM), gray-brown, moist, very dense, well graded, angular, highly variegated material.

As above, coarse serpentinite gravel and weathered reddish brown clasts.
GRAVELLY SAND (SW), olive-gray, wet, medium dense, well graded, subangular.

GRAVELLY SANDY SILT (ML), yellowish brown, very moist, low plasticity, soft.
GRAVELLY SANDY CLAY (CL), yellowish brown, moist, low plasticity, soft.
SILTY SANDY GRAVEL (GM) at 63 feet, moist, dense, coarse, angular.
CLAYEY SANDY GRAVEL (GC), variegated dark brown to pale yellow with olive-gray, moist, dense, well graded, angular, weathered.

SANDSTONE and SILTSTONE to 3 centimeters.

Wet.

BOTTOM OF BORING AT 70 FEET.

Drilling Method:	Dual-Tube/Direct Push
Drilling Company:	Precision
Date Well Drilled:	November 23, 1998
LFR Geologist:	Todd Miller, R.G., CH.G.

No. 6650
Exp. 9/30/01

EXPLANATION

☰	Clay
▤	Silt
▨	Sand
▩	Gravel
▯	PID - Photoionization Detector
▼	Water level at time of drilling

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LITHOLOGY FOR 073-BH-01 *(page 2 of 2)*

Project No. 6730.00-024

SCVWD PILOT STUDY

Depth, feet	Water Level	PID Reading (ppm)	Lithologic Description
			CLAYEY SILT (ML), brown, moist, low plasticity, medium stiff.
5		0.0	
		0.0	
		Poor recovery	
10			CLAYEY SILT (ML), dark brown, moist, stiff, trace gravel.
		0.0	
			Trace gravel, subrounded, less than 1.5 centimeters.
		0.0	
15			
		0.0	
			CLAYEY SILT (ML), brown, moist, low plasticity, medium stiff to soft.
20		0.0	
			SILTY CLAY (CL), brown, moist, medium plasticity, very soft.
		0.0	
25			BOTTOM OF BORING AT 25 FEET.
30			
35			

JENNIFER J. BEATTY
No. 6650
Exp. 1/?/0?

Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: November 23, 1998
LFR Geologist: Todd Miller, R.G., CH.G.

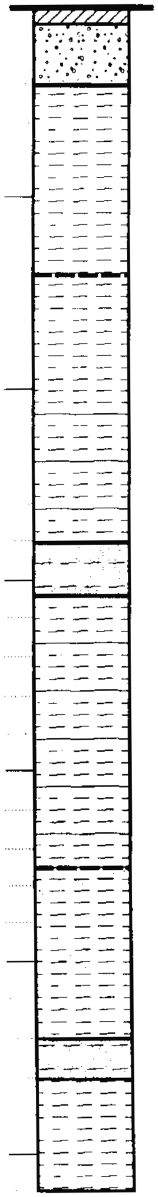
EXPLANATION

☰	Clay
▤	Silt
░	Sand
▒	Gravel

PID - Photoionization Detector

▼ Water level at time of drilling

SCVWD PILOT STUDY



Depth, feet	Water Level	PID Reading (ppm)	Lithologic Description
			ASPHALT pavement.
			SANDY GRAVEL, gray, engineered Fill.
			SANDY SILT (ML), dark grayish brown, slightly moist, medium dense, low to medium plasticity.
5		0.0	
		0.0	SANDY SILT/CLAYEY SILT (ML), dark yellowish brown, dry to slightly moist, low plasticity, stiff.
10		0.0	- soft, very moist.
			Increase sand, some gravel.
		0.0	SILTY SAND (SM), dark yellowish brown, moist, loose to medium dense.
15		0.0	
		0.0	CLAYEY SILT (ML), dark yellowish brown, slightly moist to moist, low plasticity, medium stiff.
		0.0	
20		0.0	
		0.0	SANDY SILT (ML), yellowish brown, moist, low to medium plasticity, medium stiff.
25		0.0	
			SILTY SAND (SM), yellowish brown, very moist, low plasticity, soft.
		0.0	SANDY SILT (ML), yellowish brown, moist, medium plasticity, medium stiff.
30			
		0.0	BOTTOM OF BORING AT 31 FEET.
35			

Sample Interval

No. 6630

Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: November 20, 1998
LFR Geologist: Thomas Zakaria, R.G., CH.G.

EXPLANATION

▤ Clay
▤ Silt
▨ Sand
▨ Gravel

PID - Photoionization Detector

▼ Water level at time of drilling

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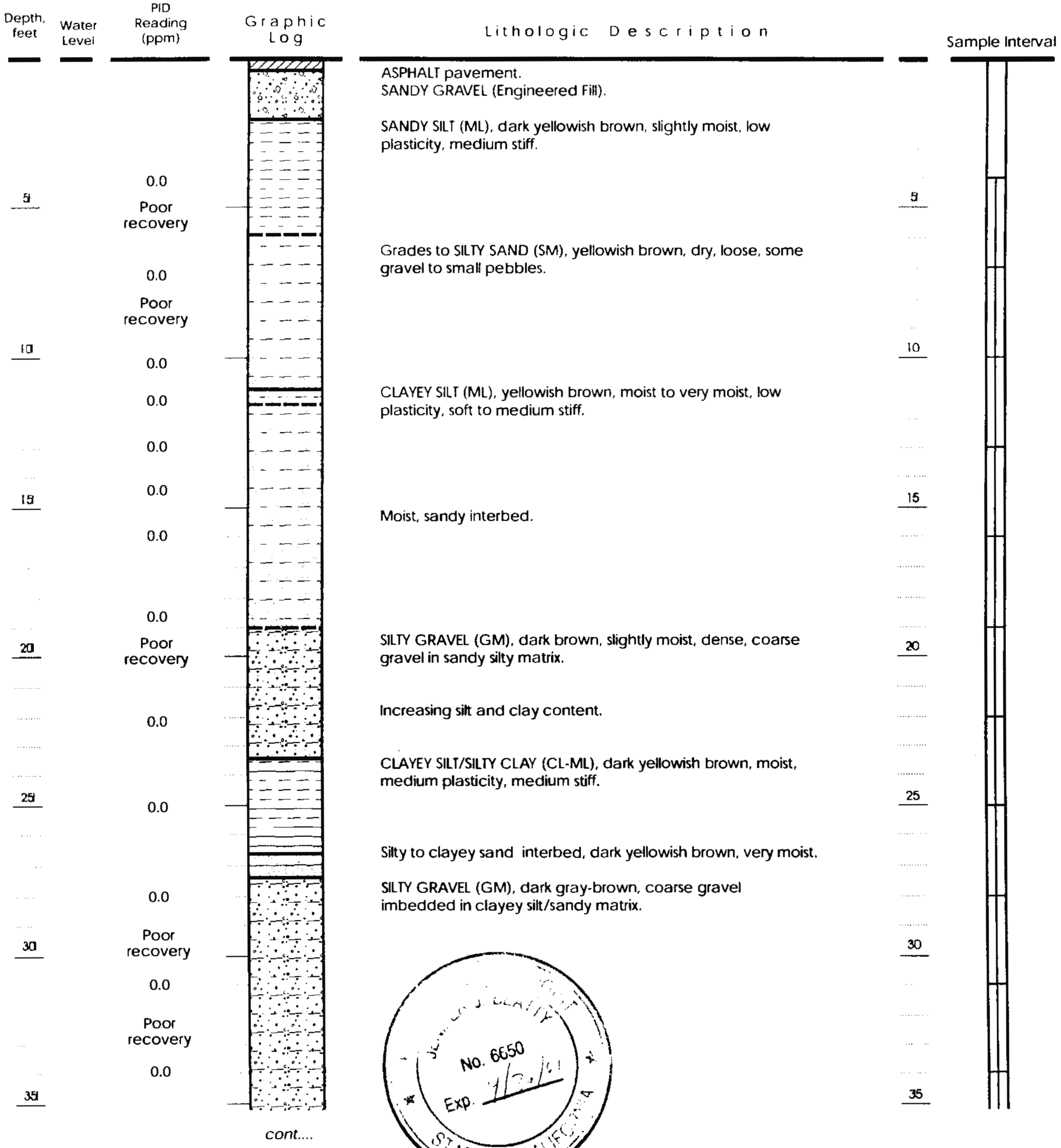
LITHOLOGY FOR 073-BH-03 *(page 1 of 1)*

Project No. 6730.00-024

SCVWD PILOT STUDY



Lithologic Description

ASPHALT pavement.
SANDY GRAVEL (Engineered Fill).

SANDY SILT (ML), dark yellowish brown, slightly moist, low plasticity, medium stiff.

Grades to SILTY SAND (SM), yellowish brown, dry, loose, some gravel to small pebbles.

CLAYEY SILT (ML), yellowish brown, moist to very moist, low plasticity, soft to medium stiff.

Moist, sandy interbed.

SILTY GRAVEL (GM), dark brown, slightly moist, dense, coarse gravel in sandy silty matrix.

Increasing silt and clay content.

CLAYEY SILT/SILTY CLAY (CL-ML), dark yellowish brown, moist, medium plasticity, medium stiff.

Silty to clayey sand interbed, dark yellowish brown, very moist.

SILTY GRAVEL (GM), dark gray-brown, coarse gravel imbedded in clayey silt/sandy matrix.

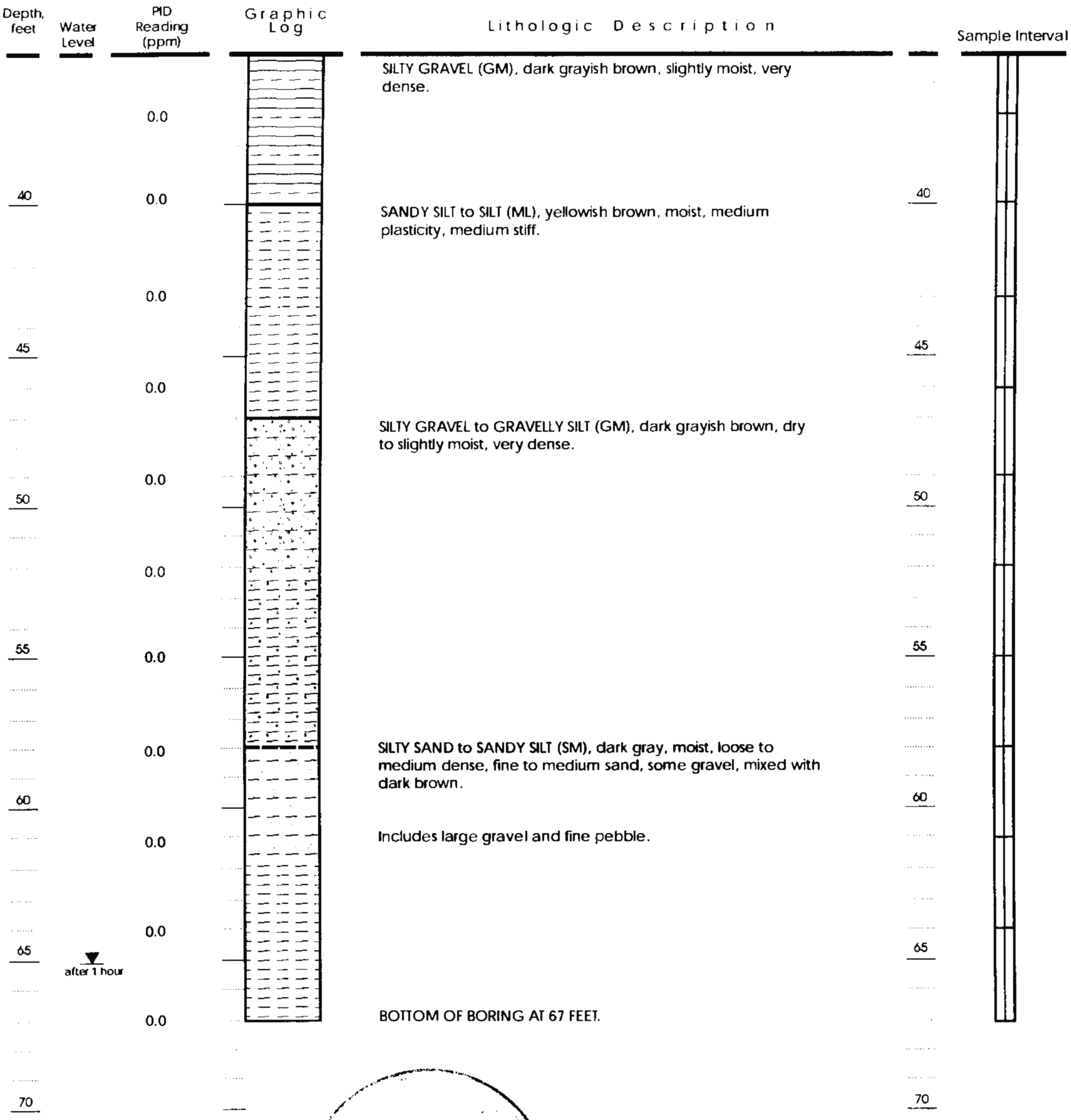
No. 6650
Exp. 1/31/01
STATE OF CALIFORNIA

EXPLANATION

- ☰ Clay
- ☷ Silt
- ░ Sand
- ⁘ Gravel
- ‖ PID - Photoionization Detector
- ▼ Water level at time of drilling

Drilling Method:	Dual-Tube/Direct Push
Drilling Company:	Precision
Date Well Drilled:	November 20, 1998
LFR Geologist:	Thomas Zakaria, R.G., CH.G.

SCVWD PILOT STUDY



SILTY GRAVEL (GM), dark grayish brown, slightly moist, very dense.

SANDY SILT to SILT (ML), yellowish brown, moist, medium plasticity, medium stiff.

SILTY GRAVEL to GRAVELLY SILT (GM), dark grayish brown, dry to slightly moist, very dense.

SILTY SAND to SANDY SILT (SM), dark gray, moist, loose to medium dense, fine to medium sand, some gravel, mixed with dark brown.

Includes large gravel and fine pebble.

BOTTOM OF BORING AT 67 FEET.

No. 6650
Exp. [illegible]

Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: November 23, 1998
LFR Geologist: Todd Miller, R.G., CH.G.

EXPLANATION

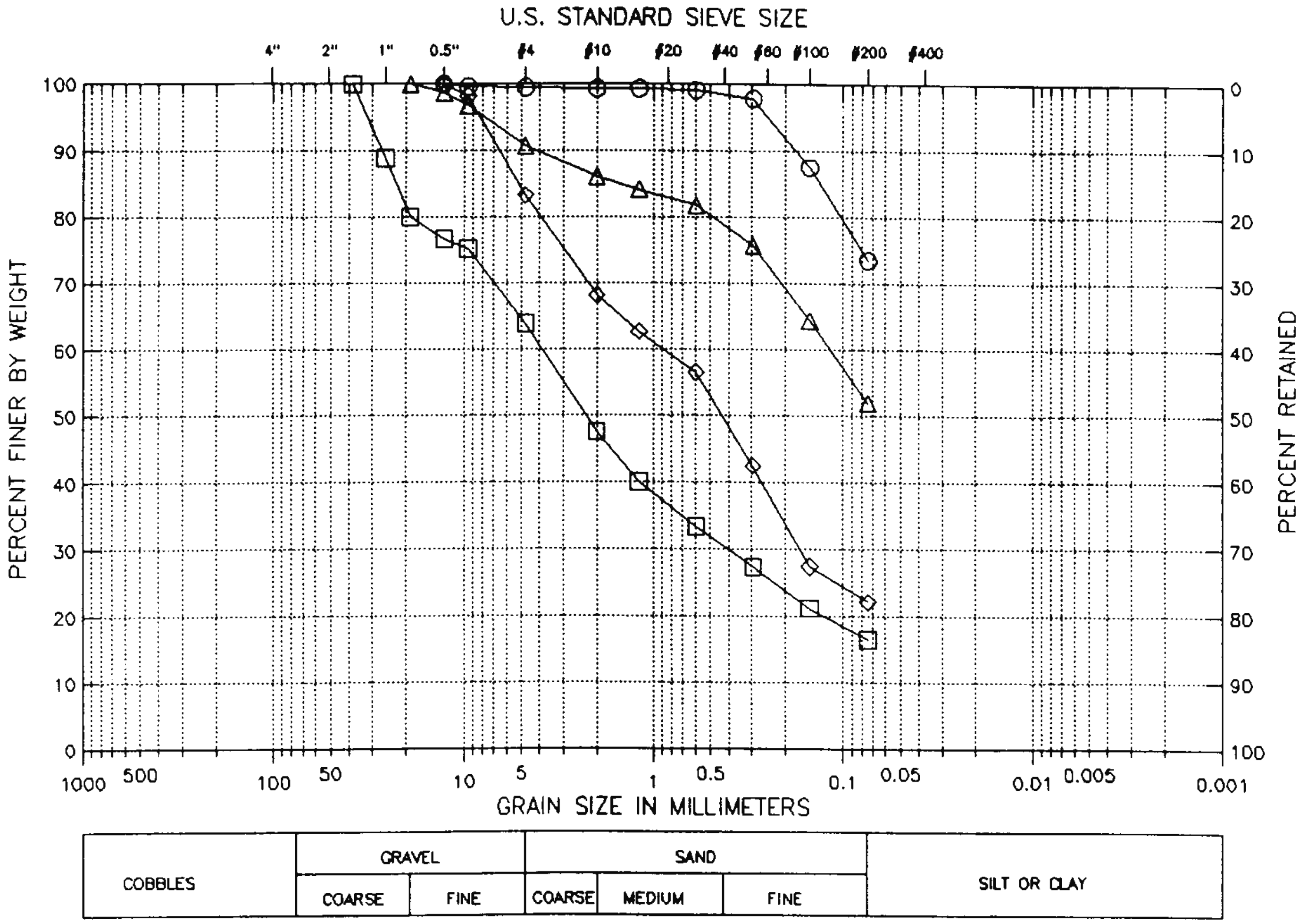
▤	Clay
▤	Silt
▨	Sand
▨	Gravel
▯	PID - Photoionization Detector
▼	Water level at time of drilling

LFR
LEVINE•FRICKE

LITHOLOGY FOR 073-BH-04 *(page 2 of 2)*

Project No. 6730.00-024

Project : LEVINE FRICKE RECON 6730.00-024
Project No.: 16148A
Location: SCVWD MTBE
Date : Wed Dec 23 1998



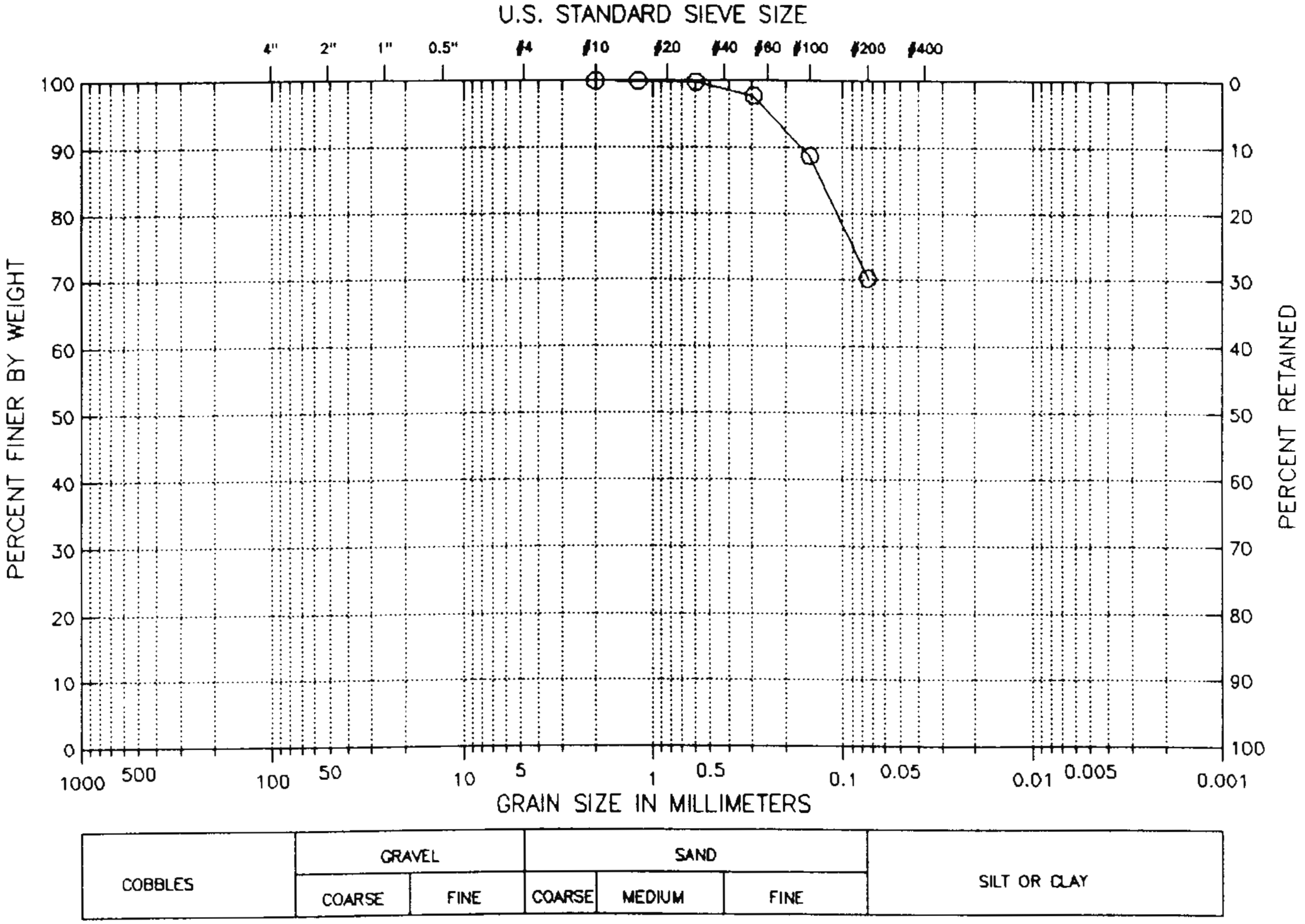
Symbol	Boring No.	Sample No.	Depth	Filename	Classification / Description
○	073-BH-04	15.5 SD	15.5 FT.	073-15	BROWN FINE SANDY SILTY CLAY
△	073-BH-04	19 SD	19.0 FT.	073-19	BROWN FINE SANDY CLAY WITH GRAVEL
□	073-BH-04	58 SD	58.0 FT.	073-58	BLUISH GRAY GRAVELLY CLAYEY SAND
◇	073-BH-04	63 SD	63.0 FT.	073-63	OLIVE BROWN GRAVELLY CLAYEY SAND

Figure 1

URS Greiner Woodward Clyde

Boring No. : 073-BH-03
Sample No.: 43 SD
Tested by : J. HEBEL
Filename : 073-43

Project : LEVINE FRICKE RECON 6730.00-024
Project No.: 16148A
Location: SCVWD MTBE
Date : Wed Dec 23 1998



Classification :

Visual Description :
MOTTLED GRAY BROWN FINE SANDY SILTY CLAY

Remarks :
Depth: 43.0 feet

Figure 1

URS Greiner Woodward Clyde

GEOTECHNICAL LABORATORY TEST DATA

Project : LEVINE FRICKE RECON 6730.00-024
Filename : 073-43
Project No. : 16148A
Depth : 43.0 FT.
Elevation : NA
Boring No. : 073-BH-03
Test Date : 12/23/98
Tested by : J. HEBEL
Sample No. : 43 SD
Test Method : ASTM D422
Checked by : S. CAPPS
Location : SCVWD MTBE
Soil Description : MOTTLED GRAY BROWN FINE SANDY SILTY CLAY
Remarks : Depth: 43.0 feet

COARSE SIEVE SET

Sieve Mesh	Sieve Openings Inches	Millimeters	Weight Retained (gm)	Cumulative Weight Retained (gm)	Percent Finer (%)
#10	0.079	2.00	0.00	0.00	100
#16	0.047	1.19	0.02	0.02	100
#30	0.023	0.60	0.36	0.38	100
#50	0.012	0.30	4.49	4.87	98
#100	0.006	0.15	19.36	24.23	89
#200	0.003	0.07	40.24	64.47	70

Total Dry Weight of Sample = 216.9

D85 : 0.1290 mm
D60 : N/A
D50 : N/A
D30 : N/A
D15 : N/A
D10 : N/A

Soil Classification
ASTM Group Symbol : N/A
ASTM Group Name : N/A
AASHTO Group Symbol : A-4(0)
AASHTO Group Name : Silty Soils

GEOTECHNICAL LABORATORY TEST DATA

Project : LEVINE FRICKE RECON 6730.00-024
Project No. : 16148A
Boring No. : 073-BH-03
Sample No. : 43 SD
Location : SCVWD MTBE
Soil Description : MOTTLED GRAY BROWN FINE SANDY SILTY CLAY
Remarks : Depth: 43.0 feet

Depth : 43.0 FT.
Test Date : 12/23/98
Test Method : ASTM D422

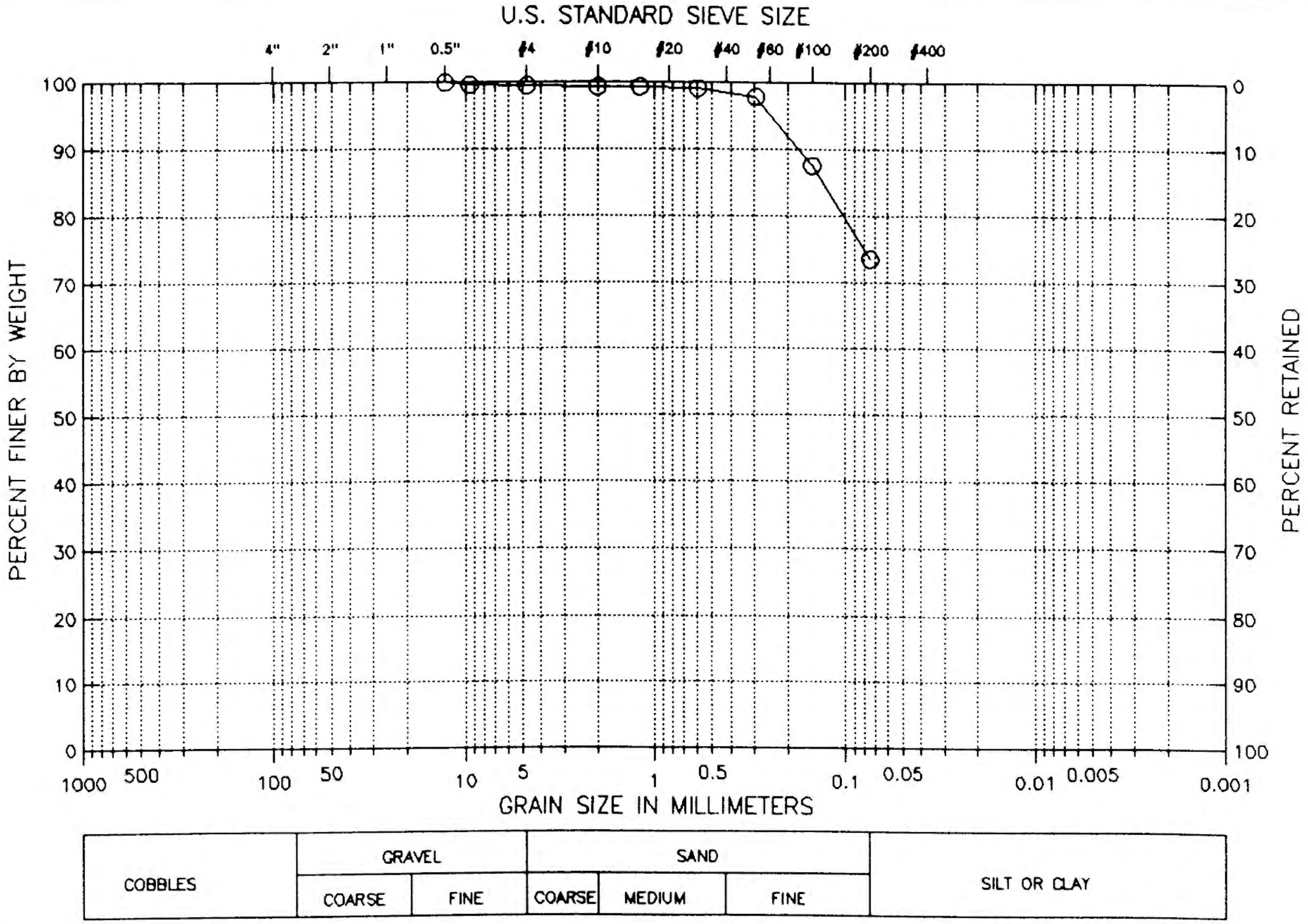
Filename : 073-43
Elevation : NA
Tested by : J. HEBEL
Checked by : S. CAPPS

Natural Moisture Content

	Moisture Content ID	Mass of Container (gm)	Mass of Container and Moist Soil (gm)	Mass of Container and Dried Soil (gm)	Moisture Content (%)
1)	073-43	224.00	482.40	440.90	19.13

Average Moisture Content = 19.13

	Boring No. : 073-BH-04 Sample No.: 15.5 SD Tested by : J. HEBEL Filename : 073-15	Project : LEVINE FRICKE RECON 6730.00-024 Project No.: 16148A Location: SCVWD MTBE Date : Wed Dec 23 1998



Classification :

Remarks :
Depth: 15.5 feet

Visual Description :
BROWN FINE SANDY SILTY CLAY

Figure 1

URS Greiner Woodward Clyde

```
Wed Dec 23 12:23:43 1998                                                                   Page :  1

                                 GEOTECHNICAL LABORATORY TEST DATA

Project : LEVINE FRICKE RECON  6730.00-024                         Filename : 073-15
Project No. : 16148A               Depth : 15.5 FT.                Elevation : NA
Boring No. : 073-BH-04             Test Date : 12/23/98            Tested by : J. HEBEL
Sample No. : 15.5 SD               Test Method : ASTM D422         Checked by : S. CAPPS
Location : SCVWD  MTBE
Soil Description : BROWN FINE SANDY SILTY CLAY
Remarks : Depth:  15.5 feet

                               COARSE SIEVE SET
Sieve          Sieve Openings          Weight       Cumulative          Percent
Mesh           Inches  Millimeters     Retained     Weight Retained     Finer
                                       (gm)         (gm)                (%)
----------     ------  -----------     --------     ---------------     -------
0.5"            0.500        12.70         0.00                0.00         100
0.375"          0.374         9.51         1.17                1.17         100
#4              0.187         4.75         0.23                1.40         100
#10             0.079         2.00         0.53                1.93          99
#16             0.047         1.19         0.24                2.17          99
#30             0.023         0.60         0.64                2.81          99
#50             0.012         0.30         3.74                6.55          98
#100            0.006         0.15        32.26               38.81          88
#200            0.003         0.07        43.90               82.71          74
     Total Dry Weight of Sample = 313.3

 D85 : 0.1308 mm
 D60 : N/A
 D50 : N/A
 D30 : N/A
 D15 : N/A
 D10 : N/A

 Soil Classification
        ASTM Group Symbol    : N/A
        ASTM Group Name      : N/A
        AASHTO Group Symbol  : A-4(0)
        AASHTO Group Name    : Silty Soils
```

Wed Dec 23 12:23:43 1998

GEOTECHNICAL LABORATORY TEST DATA

Project : LEVINE FRICKE RECON 6730.00-024		Filename : 073-15
Project No. : 16148A	Depth : 15.5 FT.	Elevation : NA
Boring No. : 073-BH-04	Test Date : 12/23/98	Tested by : J. HEBEL
Sample No. : 15.5 SD	Test Method : ASTM D422	Checked by : S. CAPPS

Location : SCVWD MTBE

Soil Description : BROWN FINE SANDY SILTY CLAY

Remarks : Depth: 15.5 feet

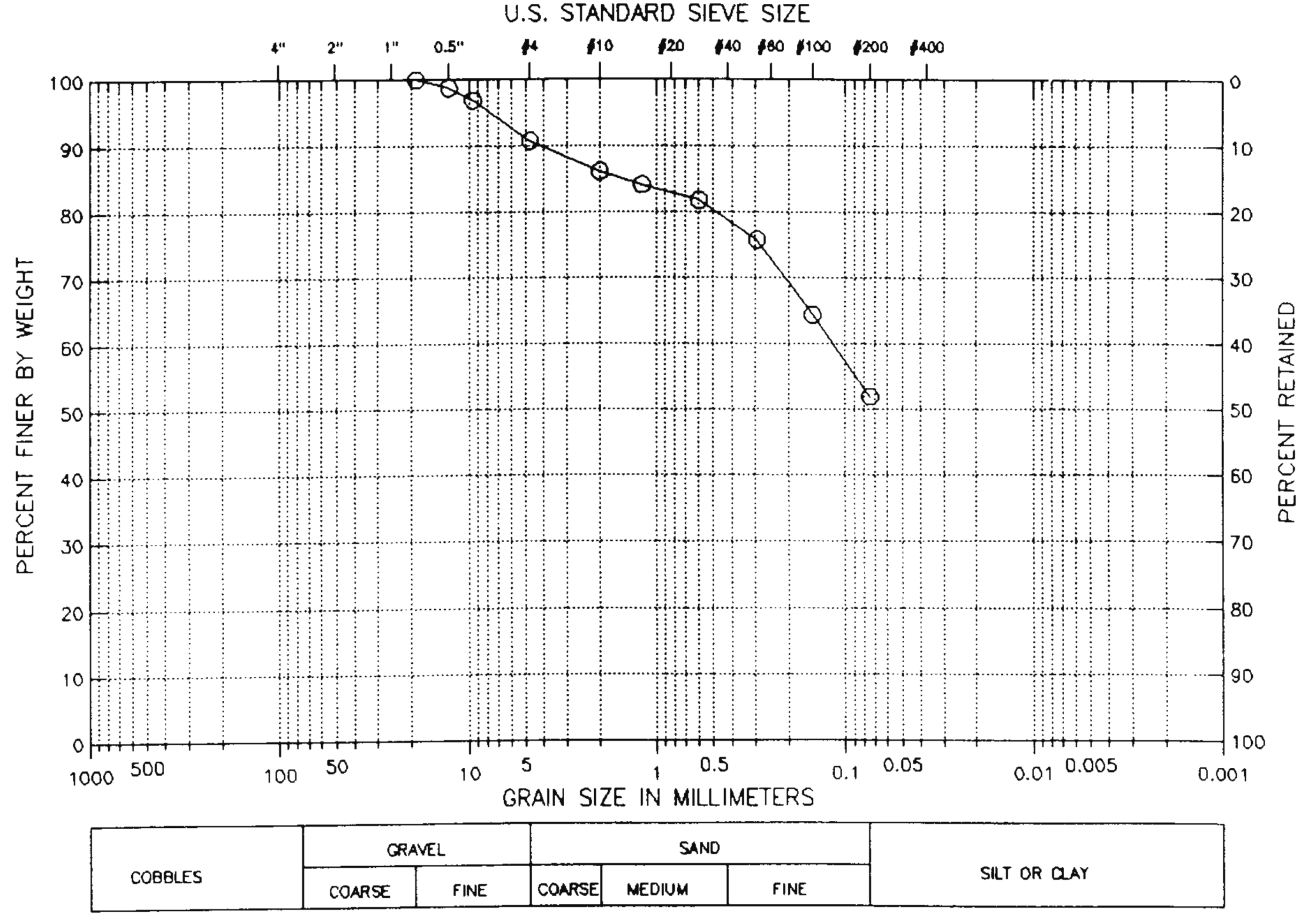
Natural Moisture Content

	Moisture Content ID	Mass of Container (gm)	Mass of Container and Moist Soil (gm)	Mass of Container and Dried Soil (gm)	Moisture Content (%)
1)	73-04-15	217.30	593.20	530.60	19.98

Average Moisture Content = 19.98

Boring No. : 073–BH–04
Sample No.: 19 SD
Tested by : J. HEBEL
Filename : 073–19

Project : LEVINE FRICKE RECON 6730.00–024
Project No.: 16148A
Location: SCVWD MTBE
Date : Wed Dec 23 1998



Classification :

Remarks :
Depth: 19.0 feet

Visual Description :
BROWN FINE SANDY CLAY WITH GRAVEL

Figure 2

URS Greiner Woodward Clyde

Wed Dec 23 12:23:48 1998

GEOTECHNICAL LABORATORY TEST DATA

Project : LEVINE FRICKE RECON 6730.00-024		Filename : 073-19
Project No. : 16148A	Depth : 19.0 FT.	Elevation : NA
Boring No. : 073-BH-04	Test Date : 12/23/98	Tested by : J. HEBEL
Sample No. : 19 SD	Test Method : ASTM D422	Checked by : S. CAPPS

Location : SCVWD MTBE
Soil Description : BROWN FINE SANDY CLAY WITH GRAVEL
Remarks : Depth: 19.0 feet

COARSE SIEVE SET

Sieve Mesh	Sieve Openings Inches	Millimeters	Weight Retained (gm)	Cumulative Weight Retained (gm)	Percent Finer (%)
0.75"	0.748	19.00	0.00	0.00	100
0.5"	0.500	12.70	3.36	3.36	99
0.375"	0.374	9.51	5.58	8.94	97
#4	0.187	4.75	17.25	26.19	91
#10	0.079	2.00	13.29	39.48	86
#16	0.047	1.19	5.74	45.22	84
#30	0.023	0.60	6.77	51.99	82
#50	0.012	0.30	17.20	69.19	76
#100	0.006	0.15	32.69	101.88	64
#200	0.003	0.07	35.58	137.46	52

Total Dry Weight of Sample = 286.3

D85 : 1.4619 mm
D60 : 0.1162 mm
D50 : N/A
D30 : N/A
D15 : N/A
D10 : N/A

Soil Classification
ASTM Group Symbol : N/A
ASTM Group Name : N/A
AASHTO Group Symbol : A-4(0)
AASHTO Group Name : Silty Soils

GEOTECHNICAL LABORATORY TEST DATA

Project : LEVINE FRICKE RECON 6730.00-024
Filename : 073-19
Project No. : 16148A
Depth : 19.0 FT.
Elevation : NA
Boring No. : 073-BH-04
Test Date : 12/23/98
Tested by : J. HEBEL
Sample No. : 19 SD
Test Method : ASTM D422
Checked by : S. CAPPS
Location : SCVWD MTBE
Soil Description : BROWN FINE SANDY CLAY WITH GRAVEL
Remarks : Depth: 19.0 feet

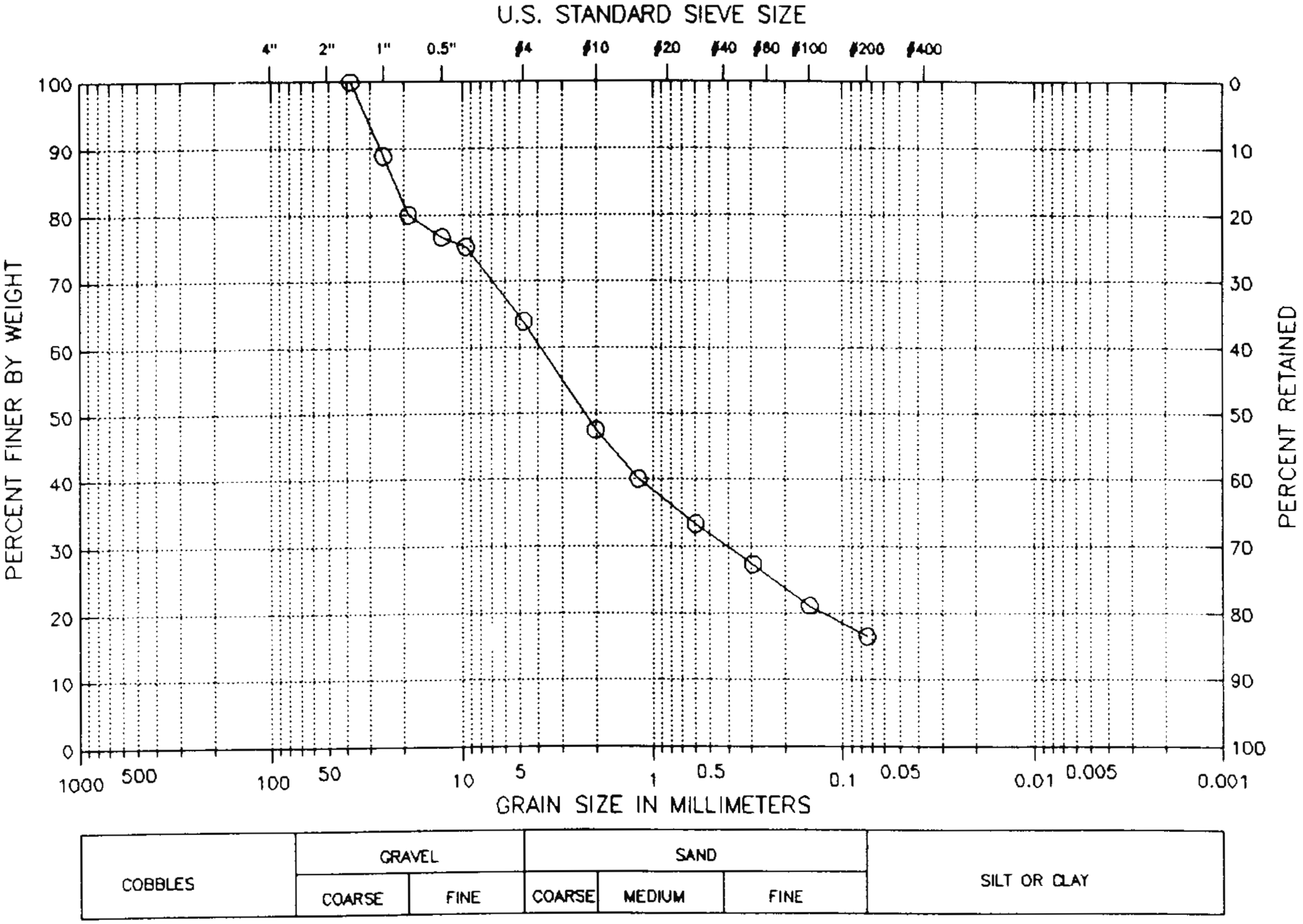
Natural Moisture Content

Moisture Content ID	Mass of Container (gm)	Mass of Container and Moist Soil (gm)	Mass of Container and Dried Soil (gm)	Moisture Content (%)
1) 73-04-19	218.70	547.30	505.00	14.77

Average Moisture Content = 14.77

Boring No. : 073-BH-04
Sample No.: 58 SD
Tested by : J. HEBEL
Filename : 073-58

Project : LEVINE FRICKE RECON 6730.00-024
Project No.: 16148A
Location: SCVWD MTBE
Date : Wed Dec 23 1998



Classification :

Remarks :
Depth: 58.0 feet

Visual Description :
BLUISH GRAY GRAVELLY CLAYEY SAND

Figure 3

URS Greiner Woodward Clyde

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Wed Dec 23 12:23:56 1998                                                    Page :  1

                              GEOTECHNICAL LABORATORY TEST DATA

Project : LEVINE FRICKE RECON  6730.00-024                    Filename : 073-58
Project No. : 16148A           Depth : 58.0 FT.               Elevation : NA
Boring No. : 073-BH-04         Test Date : 12/23/98           Tested by : J. HEBEL
Sample No. : 58 SD             Test Method : ASTM D422        Checked by : S. CAPPS
Location : SCVWD  MTBE
Soil Description : BLUISH GRAY GRAVELLY CLAYEY SAND
Remarks : Depth:  58.0 feet

                              COARSE SIEVE SET
Sieve          Sieve Openings         Weight       Cumulative          Percent
Mesh           Inches  Millimeters    Retained     Weight Retained     Finer
                                      (gm)         (gm)                (%)
----------     ------  -----------    --------     ---------------     -------
1.5"            1.500      38.10          0.00                0.00         100
1"              1.012      25.70         28.67               28.67          89
0.75"           0.748      19.00         23.12               51.79          80
0.5"            0.500      12.70          8.60               60.39          77
0.375"          0.374       9.51          3.89               64.28          75
#4              0.187       4.75         29.30               93.58          64
#10             0.079       2.00         42.76              136.34          48
#16             0.047       1.19         19.42              155.76          40
#30             0.023       0.60         17.29              173.05          33
#50             0.012       0.30         15.58              188.63          27
#100            0.006       0.15         16.02              204.65          21
#200            0.003       0.07         12.24              216.89          16
     Total Dry Weight of Sample = 259.7

 D85 : 22.4687 mm
 D60 : 3.8566 mm
 D50 : 2.2806 mm
 D30 : 0.4014 mm
 D15 : N/A
 D10 : N/A

 Soil Classification
        ASTM Group Symbol    : N/A
        ASTM Group Name      : N/A
        AASHTO Group Symbol  : A-1-b(0)
        AASHTO Group Name    : Stone Fragments, Gravel and Sand
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Wed Dec 23 12:23:56 1998

GEOTECHNICAL LABORATORY TEST DATA

Project : LEVINE FRICKE RECON 6730.00-024		Filename : 073-58
Project No. : 16148A	Depth : 58.0 FT.	Elevation : NA
Boring No. : 073-BH-04	Test Date : 12/23/98	Tested by : J. HEBEL
Sample No. : 58 SD	Test Method : ASTM D422	Checked by : S. CAPPS

Location : SCVWD MTBE

Soil Description : BLUISH GRAY GRAVELLY CLAYEY SAND

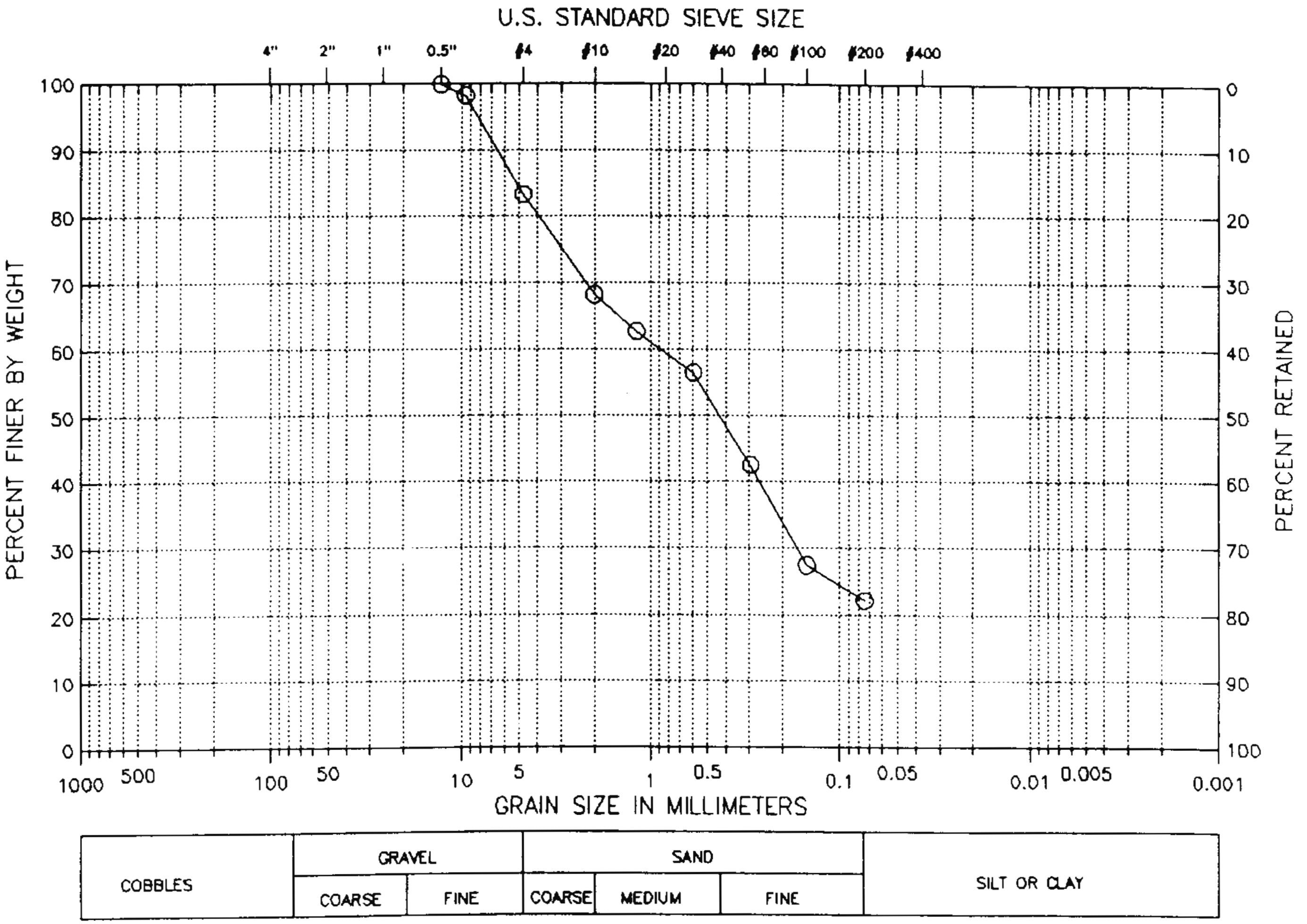
Remarks : Depth: 58.0 feet

Natural Moisture Content

Moisture Content ID	Mass of Container (gm)	Mass of Container and Moist Soil (gm)	Mass of Container and Dried Soil (gm)	Moisture Content (%)
1) 073-58	198.10	470.00	457.80	4.70

Average Moisture Content = 4.70

	Boring No. : 073–BH–04 Sample No.: 63 SD Tested by : J. HEBEL Filename : 073–63	Project : LEVINE FRICKE RECON 6730.00–024 Project No.: 16148A Location: SCVWD MTBE Date : Wed Dec 23 1998



Classification :

Remarks :
Depth: 63.0 feet

Visual Description :
OLIVE BROWN GRAVELLY CLAYEY SAND

Figure 4

URS Greiner Woodward Clyde

GEOTECHNICAL LABORATORY TEST DATA

Project : LEVINE FRICKE RECON 6730.00-024
Project No. : 16148A
Boring No. : 073-BH-04
Sample No. : 63 SD
Location : SCVWD MTBE
Soil Description : OLIVE BROWN GRAVELLY CLAYEY SAND
Remarks : Depth: 63.0 feet

Depth : 63.0 FT.
Test Date : 12/23/98
Test Method : ASTM D422

Filename : 073-63
Elevation : NA
Tested by : J. HEBEL
Checked by : S. CAPPS

COARSE SIEVE SET

Sieve Mesh	Sieve Openings Inches	Sieve Openings Millimeters	Weight Retained (gm)	Cumulative Weight Retained (gm)	Percent Finer (%)
0.5"	0.500	12.70	0.00	0.00	100
0.375"	0.374	9.51	3.74	3.74	98
#4	0.187	4.75	33.40	37.14	83
#10	0.079	2.00	33.60	70.74	68
#16	0.047	1.19	12.31	83.05	63
#30	0.023	0.60	13.79	96.84	57
#50	0.012	0.30	31.22	128.06	43
#100	0.006	0.15	33.62	161.68	27
#200	0.003	0.07	11.71	173.39	22

Total Dry Weight of Sample = 222.8

D85 : 5.1318 mm
D60 : 0.8771 mm
D50 : 0.4290 mm
D30 : 0.1674 mm
D15 : N/A
D10 : N/A

Soil Classification
ASTM Group Symbol : N/A
ASTM Group Name : N/A
AASHTO Group Symbol : A-1-b(0)
AASHTO Group Name : Stone Fragments, Gravel and Sand

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Wed Dec 23 12:28:31 1998                                                                Page :  2

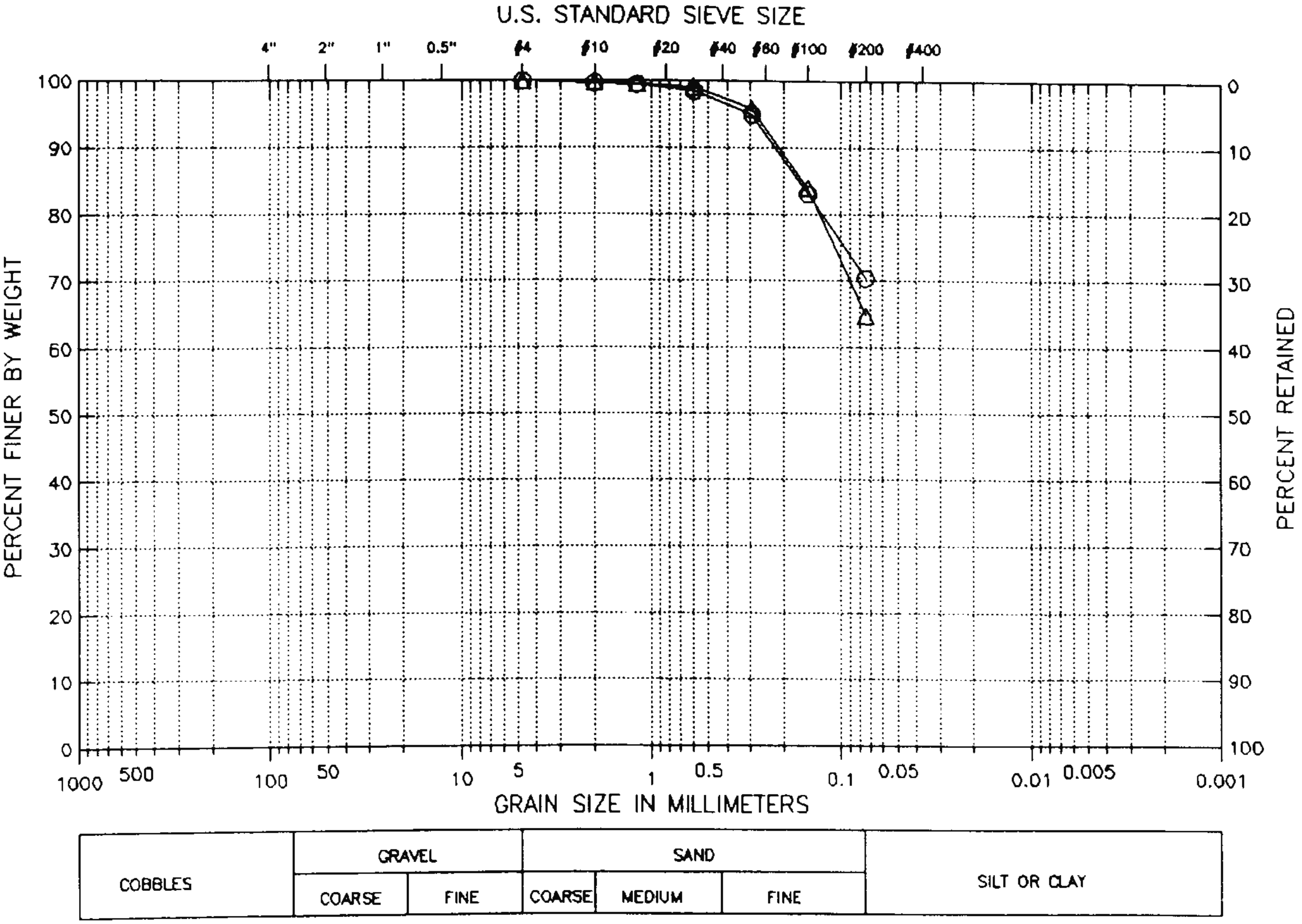
                                       GEOTECHNICAL LABORATORY TEST DATA

Project : LEVINE FRICKE RECON  6730.00-024                          Filename : 073-63
Project No. : 16148A             Depth : 63.0 FT.                   Elevation : NA
Boring No. : 073-BH-04           Test Date : 12/23/98               Tested by : J. HEBEL
Sample No. : 63 SD               Test Method : ASTM D422            Checked by : S. CAPPS
Location : SCVWD  MTBE
Soil Description : OLIVE 8ROWN GRAVELLY CLAYEY SAND
Remarks : Depth:  63.0 feet

                                        Natural Moisture Content
   Moisture Content    Mass of Container   Mass of Container   Mass of Container   Moisture Content
   ID                                      and Moist Soil      and Dried Soil
                              (gm)                (gm)                (gm)                (%)
   -----------------   -----------------   -----------------   -----------------   -----------------
1) 73-04-63                      210.30              459.00              433.10              11.62

     Average Moisture Content = 11.62
```

Project : LEVINE FRICKE RECON 6730.00-024
Project No.: 16148A
Location: SCVWD MTBE
Date : Wed Dec 16 1998



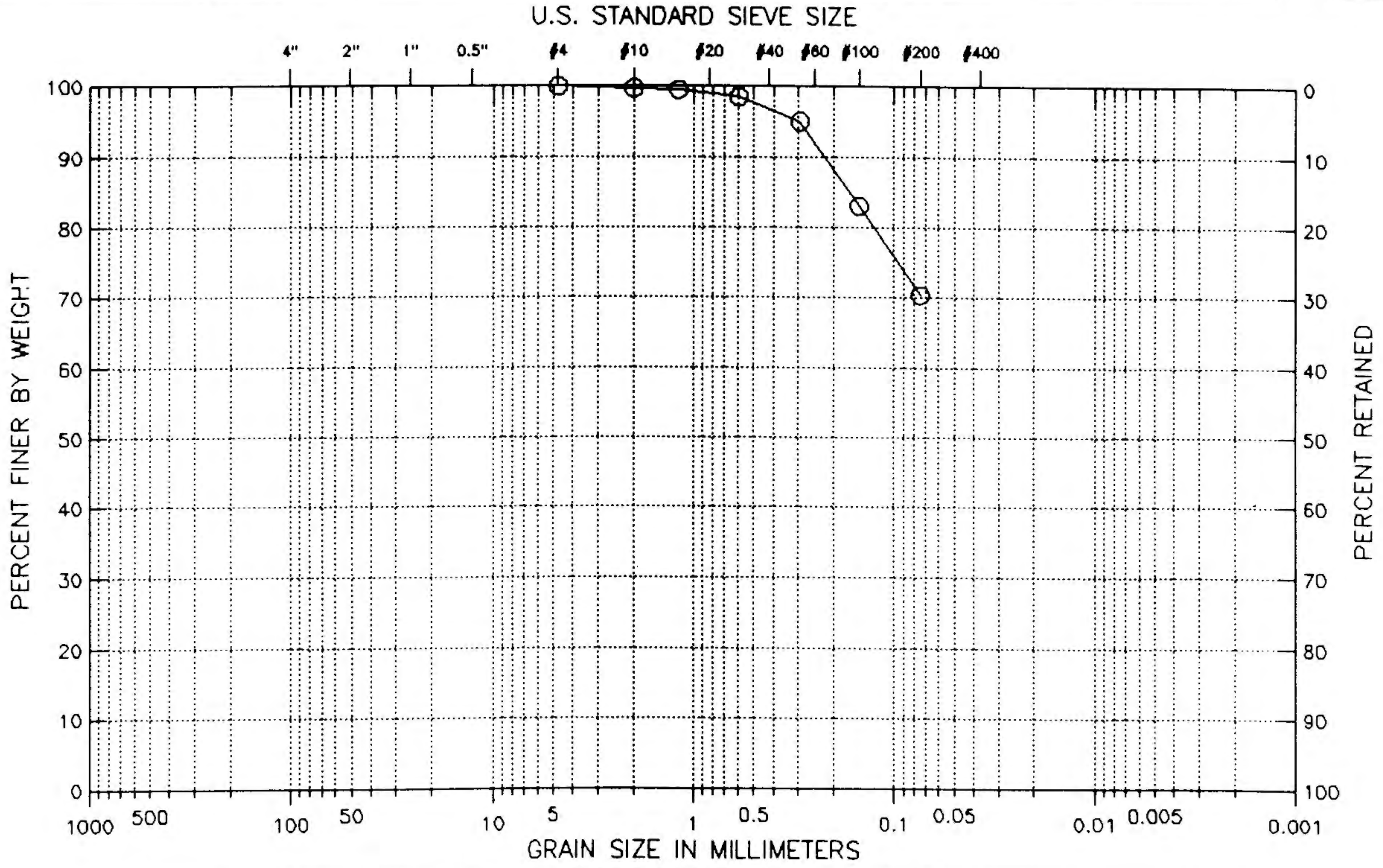
Symbol	Boring No.	Sample No.	Depth	Filename	Classification / Description
-○-	073-BH-02	11.5-12.0 SV	11.5-12.0 FT.	073-11	BROWN FINE SANDY SILTY CLAY
-△-	073-BH-02	22.5-23.0 SV	22.5-23.0 FT.	073-22	BROWN FINE SANDY CLAY

Figure 1

URS Greiner Woodward Clyde

Boring No. : 073-BH-02
Sample No.: 11.5-12.0 SV
Tested by : C. WASON
Filename : 073-11

Project : LEVINE FRICKE RECON 6730.00-024
Project No.: 16148A
Location: SCVWD MTBE
Date : Wed Dec 16 1998



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

Classification :

Visual Description :
BROWN FINE SANDY SILTY CLAY

Remarks :
Depth: 11.5-12.0 feet

Figure 1

URS Greiner Woodward Clyde

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Wed Dec 16 10:18:56 1998                                                                     Page :  1

                                      GEOTECHNICAL LABORATORY TEST DATA

Project : LEVINE FRICKE RECON  6730.00-024                        Filename : 073-11
Project No. : 16148A            Depth : 11.5-12.0 FT.             Elevation : NA
Boring No. : 073-BH-02          Test Date : 12/16/98              Tested by : C. WASON
Sample No. : 11.5-12.0 SV       Test Method : ASTM D422           Checked by : S. CAPPS
Location : SCVWD  MTBE
Soil Description : BROWN FINE SANDY SILTY CLAY
Remarks : Depth: 11.5-12.0 feet

                                    COARSE SIEVE SET
Sieve          Sieve Openings        Weight        Cumulative        Percent
Mesh           Inches  Millimeters   Retained      Weight Retained   Finer
                                     (gm)          (gm)              (%)
----------     ------  -----------   --------      ---------------   -------
#4              0.187       4.75         0.00                0.00        100
#10             0.079       2.00         0.58                0.58        100
#16             0.047       1.19         0.44                1.02         99
#30             0.023       0.60         1.85                2.87         99
#50             0.012       0.30         6.64                9.51         95
#100            0.006       0.15        23.05               32.56         83
#200            0.003       0.07        24.62               57.18         70
     Total Dry Weight of Sample = 193.05

 D85 : 0.1658 mm
 D60 : N/A
 D50 : N/A
 D30 : N/A
 D15 : N/A
 D10 : N/A

 Soil Classification
        ASTM Group Symbol    : N/A
        ASTM Group Name      : N/A
        AASHTO Group Symbol  : A-4(0)
        AASHTO Group Name    : Silty Soils
```

GEOTECHNICAL LABORATORY TEST DATA

Project : LEVINE FRICKE RECON 6730.00-024
Project No. : 16148A
Boring No. : 073-BH-02
Sample No. : 11.5-12.0 SV
Location : SCVWD MTBE
Soil Description : BROWN FINE SANDY SILTY CLAY
Remarks : Depth: 11.5-12.0 feet

Depth : 11.5-12.0 FT.
Test Date : 12/16/98
Test Method : ASTM D422

Filename : 073-11
Elevation : NA
Tested by : C. WASON
Checked by : S. CAPPS

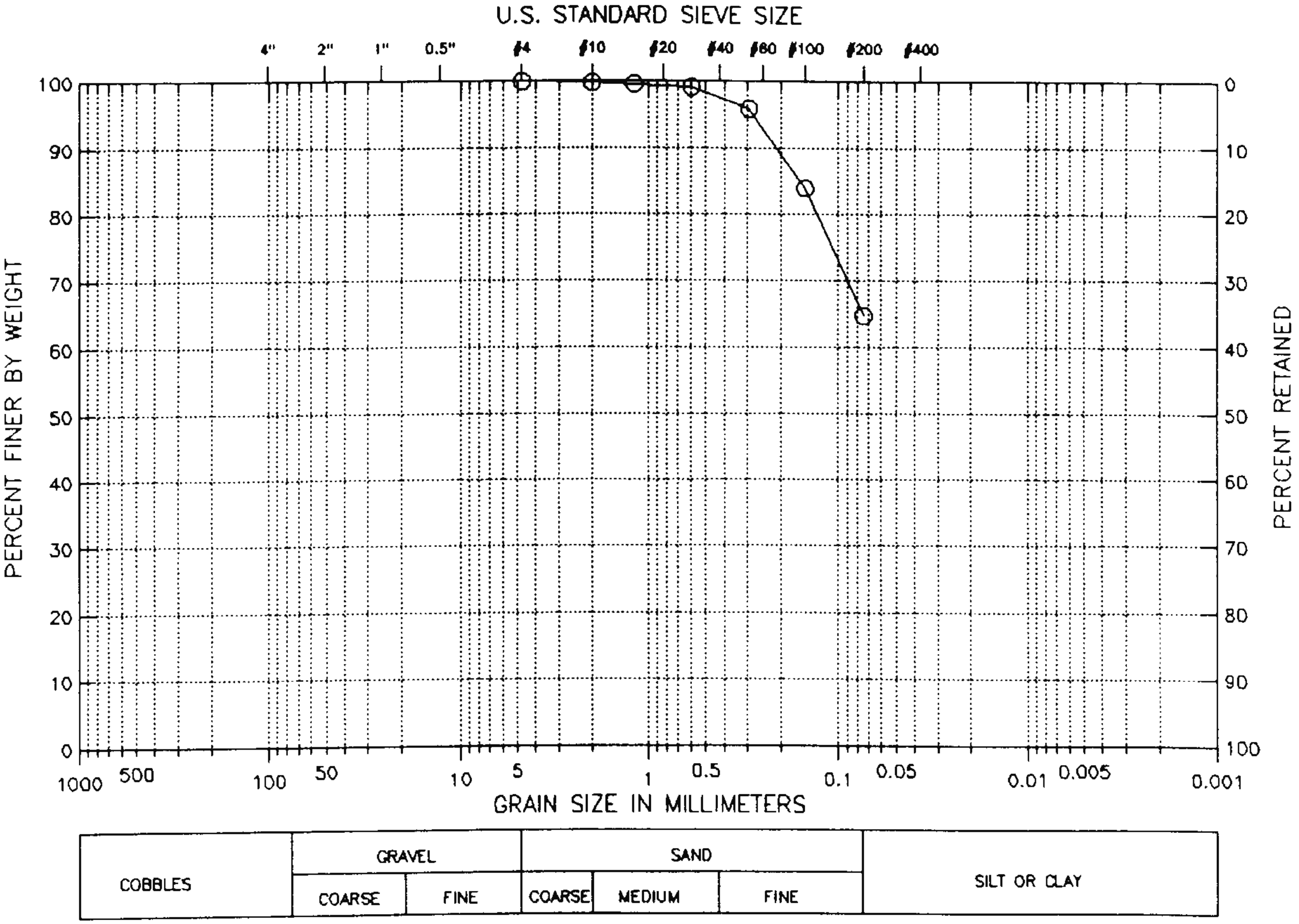
Natural Moisture Content

	Moisture Content ID	Mass of Container (gm)	Mass of Container and Moist Soil (gm)	Mass of Container and Dried Soil (gm)	Moisture Content (%)
1)	73-02-11	222.38	459.60	415.43	22.88

Average Moisture Content = 22.88

Boring No. : 073-BH-02
Sample No.: 22.5-23.0 SV
Tested by : C. WASON
Filename : 073-22

Project : LEVINE FRICKE RECON 6730.00-024
Project No.: 16148A
Location: SCVWD MTBE
Date : Wed Dec 16 1998



Classification :

Visual Description :
BROWN FINE SANDY CLAY

Remarks :
Depth: 22.5-23.0 feet

Figure 1

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Wed Dec 16 11:13:32 1998                                                             Page :  1

                                 GEOTECHNICAL LABORATORY TEST DATA

Project : LEVINE FRICKE RECON  6730.00-024                        Filename : 073-22
Project No. : 16148A           Depth : 22.5-23.0 FT.              Elevation : NA
Boring No. : 073-BH-02         Test Date : 12/16/98               Tested by : C. WASON
Sample No. : 22.5-23.0 SV      Test Method : ASTM D422            Checked by : S. CAPPS
Location : SCVWD  MTBE
Soil Description : BROWN FINE SANDY CLAY
Remarks : Depth: 22.5-23.0 feet

                              COARSE SIEVE SET
Sieve         Sieve Openings         Weight      Cumulative         Percent
Mesh          Inches   Millimeters   Retained    Weight Retained    Finer
                                     (gm)        (gm)               (%)
----------    ------   -----------   --------    ---------------    -------
#4             0.187       4.75         0.00               0.00        100
#10            0.079       2.00         0.38               0.38        100
#16            0.047       1.19         0.44               0.82        100
#30            0.023       0.60         0.99               1.81         99
#50            0.012       0.30         6.71               8.52         96
#100           0.006       0.15        24.95              33.47         84
#200           0.003       0.07        40.26              73.73         65
     Total Dry Weight of Sample = 209.35

 D85 : 0.1577 mm
 D60 : N/A
 D50 : N/A
 D30 : N/A
 D15 : N/A
 D10 : N/A

 Soil Classification
        ASTM Group Symbol   : N/A
        ASTM Group Name     : N/A
        AASHTO Group Symbol : A-4(0)
        AASHTO Group Name   : Silty Soils
```

GEOTECHNICAL LABORATORY TEST DATA

Project : LEVINE FRICKE RECON 6730.00-024
Project No. : 16148A
Boring No. : 073-BH-02
Sample No. : 22.5-23.0 SV
Location : SCVWD MTBE
Soil Description : BROWN FINE SANDY CLAY
Remarks : Depth: 22.5-23.0 feet

Depth : 22.5-23.0 FT.
Test Date : 12/16/98
Test Method : ASTM D422

Filename : 073-22
Elevation : NA
Tested by : C. WASON
Checked by : S. CAPPS

Natural Moisture Content

	Moisture Content ID	Mass of Container (gm)	Mass of Container and Moist Soil (gm)	Mass of Container and Dried Soil (gm)	Moisture Content (%)
1)	73-02-22	209.65	465.00	419.00	21.97

Average Moisture Content = 21.97

SANTA CLARA VALLEY WATER DISTRICT

Pilot Study of Operating Underground Storage Tanks

Santa Clara County, California

Site Report

SITE NUMBER 145

Pacific Bell
3025 Raymond Street
Santa Clara, California 95050

May 13, 1999

This Site Report is one of a series of reports prepared for the Santa Clara Valley Water District's Pilot Study of Operating Underground Storage Tanks. The District funded this study to assess if MtBE is being released from UST systems that meet 1998 federal- and state-mandated upgrade requirements. The District will use the results of the Pilot Study, and possibly information obtained during subsequent investigations, to evaluate whether up-graded UST systems that handle MtBE are protective of groundwater quality, and ultimately drinking water. This Study and other District groundwater vulnerability assessments are critical in formulating a plan to protect drinking water supplies into the future.

With assistance from the Santa Clara Fire Department, LFR Levine·Fricke completed a file review and conducted soil and groundwater sampling adjacent to this site on behalf of the District. This report provides a brief summary of investigation findings, and site-specific data in tables, figures, and appendices. This Site Report is appended to the Summary Report for the Study.

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SUMMARY OF FINDINGS

SITE DESCRIPTION

Figure 1 illustrates the site location. Site geology consists primarily of clays and silts to approximately 15 feet below ground surface (bgs) underlain by a silty sand to approximately 19 feet bgs. The shallowest depth to groundwater measured was approximately 8 feet bgs.

SYSTEM DESCRIPTION

The UST system at the site consists of one unlined, double-walled gasoline UST constructed of steel with fiberglass reinforced plastic exterior corrosion protection, and double-walled enviroflex piping. The UST system utilizes continuous interstitial monitoring for both piping and UST leak detection.

RESULTS

No MtBE or petroleum hydrocarbon constituents (benzene, toluene, ethylbenzene, and/or xylenes) were detected in soil or groundwater samples collected from the borings located adjacent to the site.

SITE SELECTION CRITERIA MET

1998 upgrade compliant?	Yes
On SCVWD fuel leak database?	Yes
Status:	Listed in March 1999; see File Review comments below.
Distance from LUST site:	Greater than 250 feet
Distance to water supply well:	Less than 2000 feet
Access granted?	No
SCVWD approved?	Yes

FILE REVIEW SUMMARY

Number of tanks:	1
Reported release?	Yes, from former UST, see comments below.
Release date:	Not applicable
Fuel released:	Not applicable
Location:	Not applicable
Quantity (gallons):	Not applicable
Data available:	Not applicable

Comments:

Fuel was apparently released during UST replacement in 1997. Up to 930 μg/l of MtBE was detected in groundwater in the UST excavation; no MtBE was detected in any soil samples collected from the excavation. Approximately 1,300 gallons of groundwater was pumped from the excavation in August 1997 prior to UST replacement. The data was apparently discovered by the Fire Dept. in Nov. 1998 and forwarded to the SCVWD in February 1999.

SITE VISIT - UST SYSTEM INFORMATION

Precision tank tightness records available? No

Date of last test:	Not applicable
Method of tank testing:	Not applicable
Tank leak rate (gallons/hour):	Not applicable
UST overfill prevention system present?	Yes
Type of system:	Both overfill limiter and drop tube/check-valve
Automatic shut-off?	Yes
System operational?	Yes
Overfill containment (gallons):	15
Drop tube equipped with striker plate?	Yes
Under island containment present?	Could not determine
Under island containment monitoring:	Not noted
Quick release dispenser hoses?	Yes
Alarm system functional?	Yes
Type:	Shut-Off
Vents:	
Vent type:	Dedicated
Vent piping:	Single walled
Condition of UST turbine sump:	Fair
Condition of UST flex line sump:	Good
Vapor recovery system:	Balanced
Years of operation since upgrade:	Approximately 1.5 years
Years of operation as fueling facility:	Not available
Estimated throughput:	Less than 100,000 gallons per month
Monitoring systems operational?	Yes
Systems operations, comment:	See comments below.
Tank annular space monitoring:	Liquid probe
Overfill containment monitoring system:	Liquid probe
Piping leak detection:	Liquid probe
Is system monitored?	Yes
Station inventory records available?	Not available
Records up to date?	Not applicable
Records complete?	Not applicable
Supplier log reviewed?	Not available
Spill log reviewed?	No
Spill log comments:	None maintained
Personnel training:	Not noted

Comments:

Test boot was left on the piping secondary containment preventing the probe within the sump from detecting a leak. There was slight staining around the dispenser.

SITE INSPECTION

Site inspection not conducted for off-site investigations.

UST SYSTEM DATA FROM FORM B COLLECTED DURING FILE REVIEWS - TANK ID # 2059

Date installed:	7/97
Tank capacity (gallons):	8,000
Tank contents:	Regular unleaded
Tank construction:	
Type of system:	Double wall
Tank material (primary tank):	Bare steel
Lining compatible with 100% methanol:	No
Exterior corrosion protection:	Fiberglass reinforced plastic
Date spill containment installed:	1997
Date overfill protection equipment installed:	1997
Drop tube:	Not noted
Striker plate:	Not noted
Dispenser containment:	Not noted
Piping information:	
System type:	Suction, underground
Construction:	Double wall, underground
Material and corrosion protection:	
Leak detection:	Continuous interstitial monitoring
Tank leak detection?	Continuous interstitial monitoring

Table 1
Summary of Chemical Analysis Results for Soil Samples - Site #145
Santa Clara Valley Water District

Location	Date Sampled	Depth (ft bgs)	Methyl Tertiary Butyl Ether (MTBE) ug/Kg	TPH as Gasoline (TPHg) mg/Kg	Benzene (B) ug/Kg	Toluene (T) ug/Kg	Ethyl Benzene (E) ug/Kg	meta/para-Xylenes (m/p-X) ug/Kg	ortho-Xylene (o-X) ug/Kg	Di-isopropyl Ether (DIPE) ug/Kg	Ethyl Tertiary Butyl Ether (ETBE) ug/Kg	Tertiary Amyl Methyl Ether (TAME) ug/Kg	Tertiary Butyl Alcohol (TBA) ug/Kg
145-BH-01	01/22/99	5.0-5.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		7.5-8.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
145-BH-02	01/22/99	5.5-6.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		9.0-9.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
145-BH-03	01/22/99	3.5-4.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		7.5-8.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200

Table proofed by CLC.

Notes:

All samples were analyzed by Alpha Analytical, Inc. of Sparks, NV, using EPA Method 8260 for MTBE, BTEX, DIPE, ETBE, TAME, and TBA, and Modified EPA Method 8015 for TPHg.

ft bgs = feet below ground surface
mg/Kg = milligrams per kilogram
TPH = total petroleum hydrocarbons
ug/Kg = micrograms per kilogram

Data Qualifiers (if shown on table):

J = Estimated value
UJ =Not detected at the estimated reporting limit shown

Table 2
Summary of Chemical Analysis Results for Groundwater Samples - Site # 145
Santa Clara Valley Water District

Location	Date Sampled	Depth (ft bgs)	Methyl Tertiary Butyl Ether (MTBE) ug/L	TPH as Gasoline (TPHg) mg/L	Benzene (B) ug/L	Toluene (T) ug/L	Ethyl Benzene (E) ug/L	meta/para-Xylenes (m/p-X) ug/L	ortho-Xylene (o-X) ug/L	Di-isopropyl Ether (DIPE) ug/L	Ethyl Tertiary Butyl Ether (ETBE) ug/L	Tertiary Amyl Methyl Ether (TAME) ug/L	Tertiary Butyl Alcohol (TBA) ug/L
145-BH-01	01/22/99	19.0	<0.5	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<10
145-BH-01-DUP		19.0	<0.5	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<10
145-BH-02	01/22/99	19.0	<0.5	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<10
145-BH-03	01/22/99	9.0	<0.5	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<10

Table proofed by CLC.

Notes:

All primary and field duplicate (-DUP) samples were analyzed by Alpha Analytical, Inc. of Sparks, NV, using EPA Method 8260 for MTBE, BTEX, DIPE, ETBE, TAME, and TBA, and Modified EPA Method 8015 for TPHg.

ft bgs = feet below ground surface
mg/L = milligrams per liter
TPH = total petroleum hydrocarbons
ug/L = micrograms per liter

Data Qualifiers (if shown on table):

J = Estimated value
UJ =Not detected at the estimated reporting limit shown

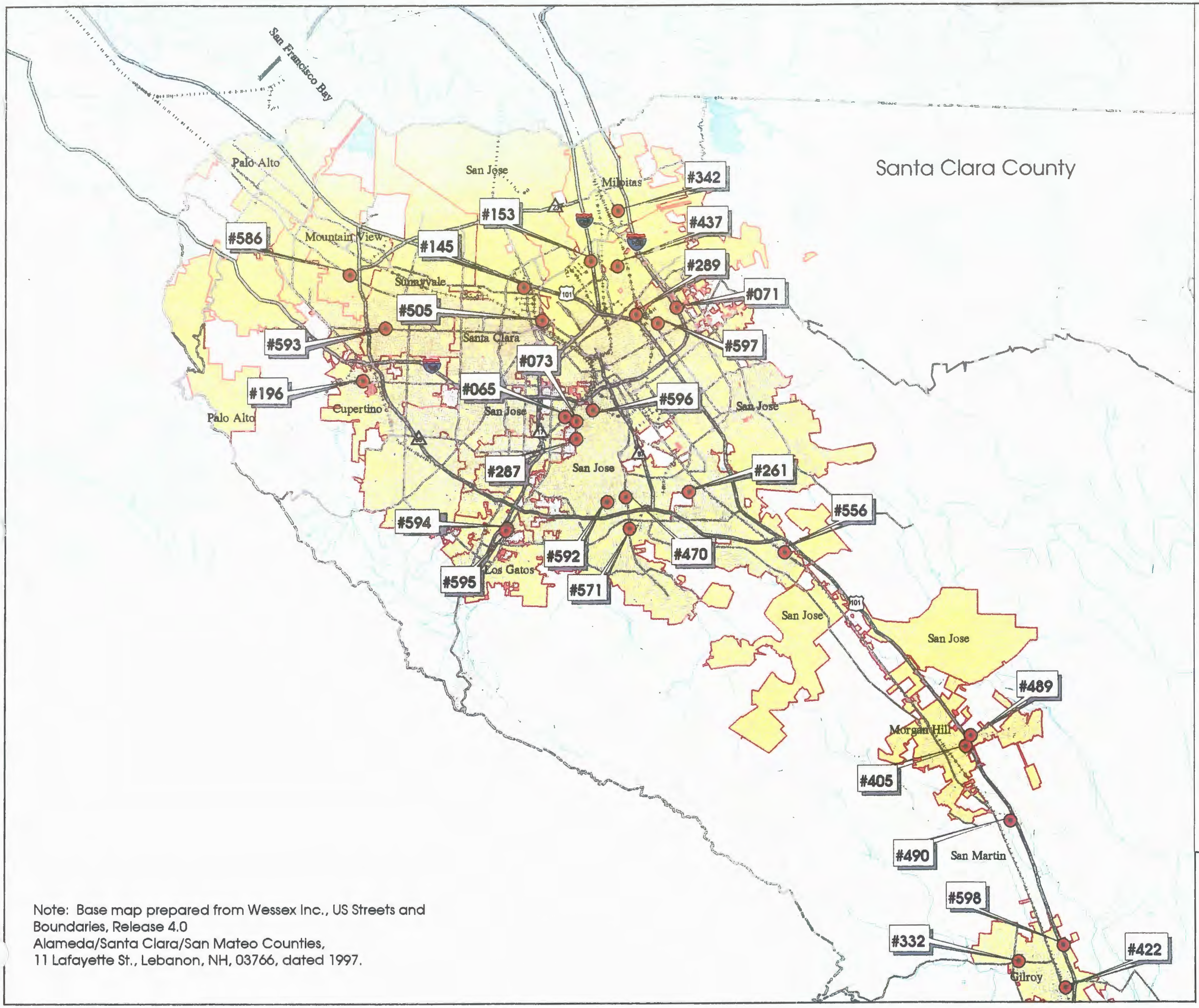
Table 3
Summary of Physical Parameters for Soil Samples - Site #145
Santa Clara Valley Water District

Location	Depth (ft bgs)	Visual Description	Total Organic Carbon (percent)	Moisture Content (percent)	Wet Weight (lbs/cu.ft.)	Dry Unit Weight (lbs/cu.ft.)	Porosity (percent)
145-BH-01	9.0 - 9.5	Brown sandy silty clay/sandy clayey silt	0.03	24.77	129.4	103.7	38.44
	17.0 - 17.5	Brown silty sand	0.10	19.04	125.9	105.7	37.25

Table proofed by CLC.

Notes:

Specific gravity values were 2.70 for all samples analyzed.
Total organic carbon analyses were performed by Curtis and Tompkins Analytical Laboratories, Berkeley, CA.
All other analyses were performed by URS Greiner Woodward Clyde, Oakland, CA.
ft bgs = feet below ground surface
lbs/cu.ft. = pounds per cubic foot
NA = Not analyzed



Note: Base map prepared from Wessex Inc., US Streets and Boundaries, Release 4.0
Alameda/Santa Clara/San Mateo Counties,
11 Lafayette St., Lebanon, NH, 03766, dated 1997.

Legend

●	Site Location
🟨	City within Santa Clara County
	Santa Clara County Boundary
	Rivers, Creeks, and Streams
═	Freeway
—	Principal Arterials
-	Local Streets and Roads
┈	Railroad Lines

3 0 3 Miles

Santa Clara Valley Water District
Pilot Study Sites

Santa Clara Valley Water District

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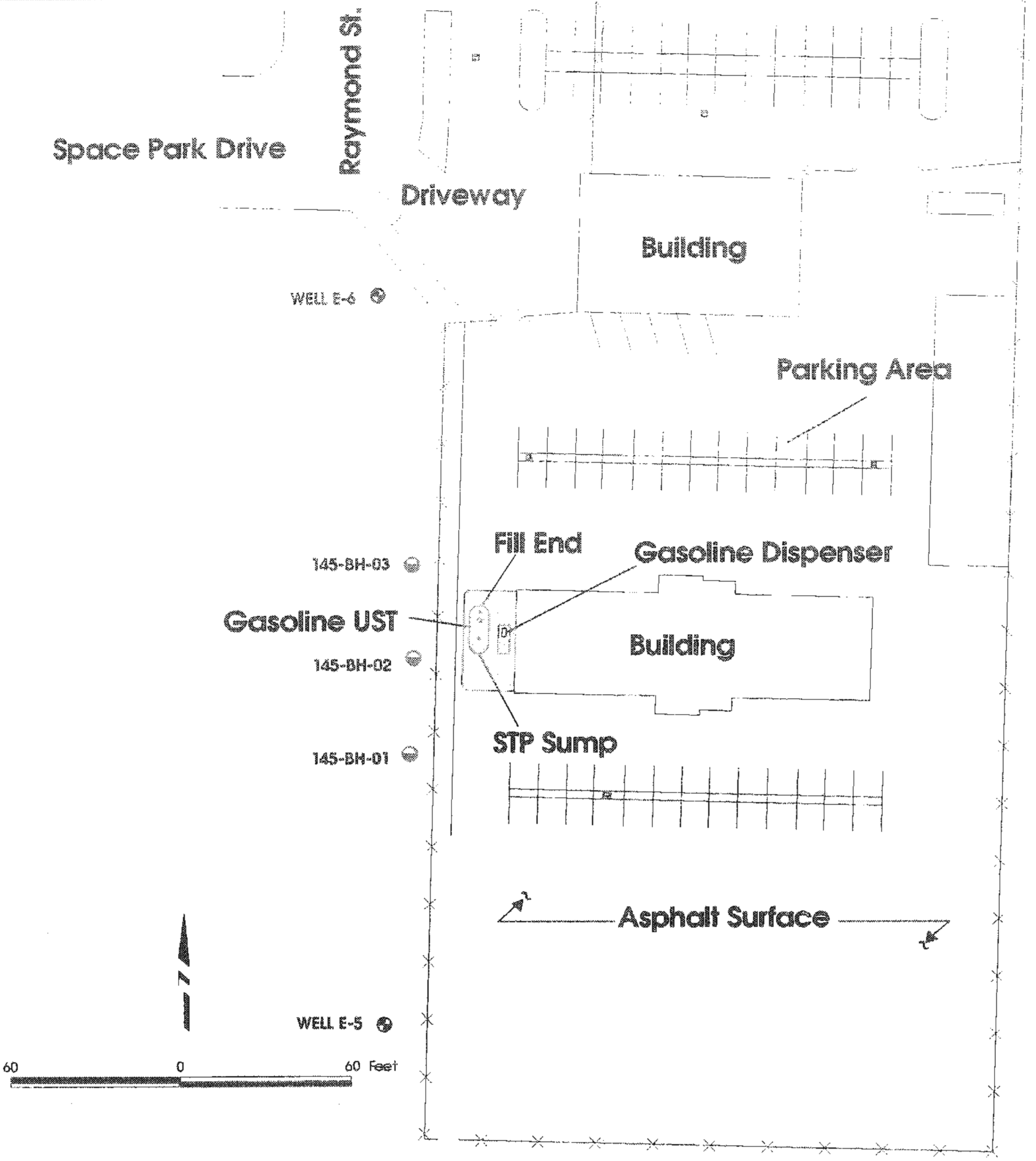
Figure 1



Legend

UST - Underground storage tank

○ UST access port

▭ Concrete slab

▪ Storm Drain Catch Basin

◒ Soil and groundwater sampling location

● Groundwater monitoring well

STP - Submersible Turbine Pump

Note: Base map prepared from a site map of Pacific Bell, SNTCCA62, N4618, 3025 Raymond Street, Santa Clara, CA, dated 12/1/97.

Site #145

Site Plan

Santa Clara Valley Water District

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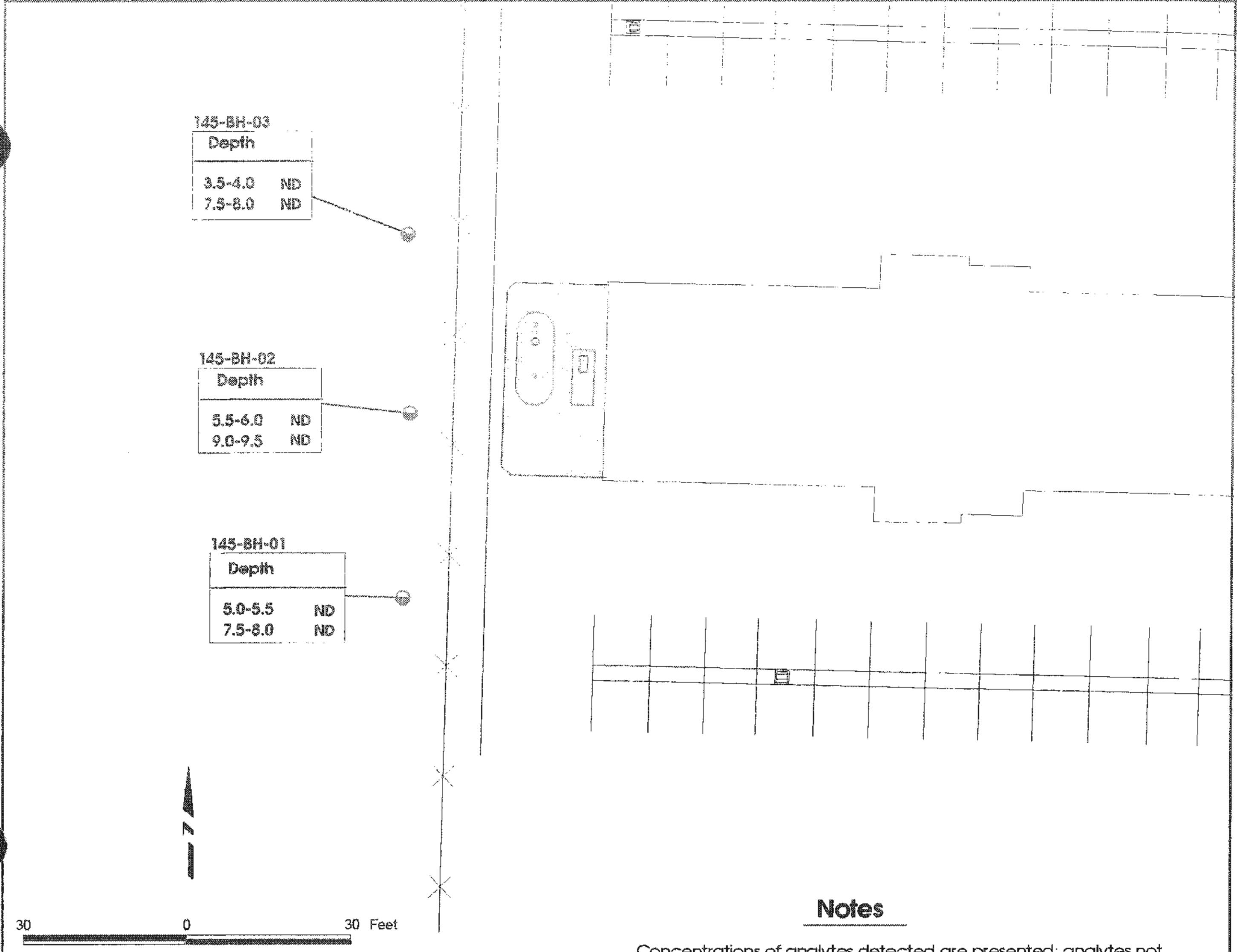
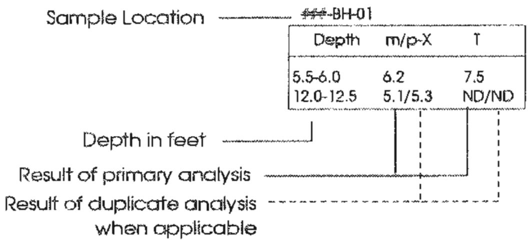
Figure 2



Legend

● Soil and groundwater sampling location

The following represents a hypothetical sampling point and defines the characters associated with that point:



UST - Underground storage tank

○ UST access port

▭ Concrete slab

⊟ Storm Drain Catch Basin

See Figure 2 for description of site features and origin of base map.

Notes

Concentrations of analytes detected are presented; analytes not detected are not presented or are presented as ND (not detected). TPHg was analyzed using Modified EPA Method 8015, all other analytes were analyzed using EPA Method 8260.

Results in micrograms/kilogram (ug/Kg) for all compounds except TPHg which is presented in milligrams/kilogram (mg/Kg).

RL = Reporting Limit

Each sample was analyzed for the following:

MTBE = Methyl Tertiary Butyl Ether (RL = 5 ug/Kg)
TPHg = Total Petroleum Hydrocarbons as Gasoline (RL = 1 mg/Kg)
B = Benzene (RL = 5 ug/Kg)
T = Toluene (RL = 5 ug/Kg)
E = Ethyl Benzene (RL = 5 ug/Kg)
m/p-X = meta/para-Xylenes (RL = 5 ug/Kg)
o-X = ortho-Xylene (RL = 5 ug/Kg)
DIPE = Di-isopropyl Ether (RL = 20 ug/Kg)
ETBE = Ethyl Tertiary Butyl Ether (RL = 20 ug/Kg)
TAME = Tertiary Amyl Methyl Ether (RL = 20 ug/Kg)
TBA = Tertiary Butyl Alcohol (RL = 200 ug/Kg)

Site #145

Summary of Chemical Analysis Results for Soil Samples

Santa Clara Valley Water District

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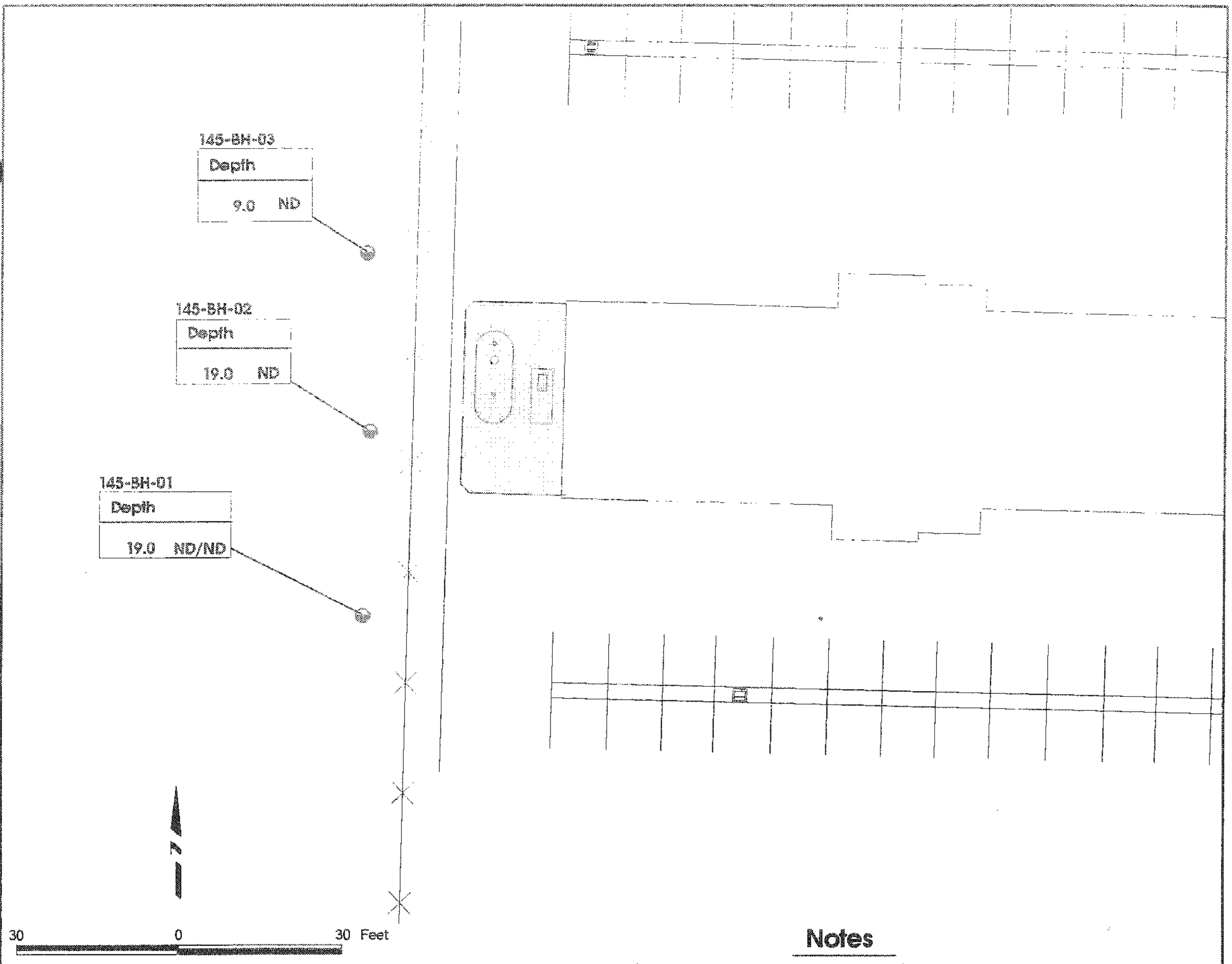
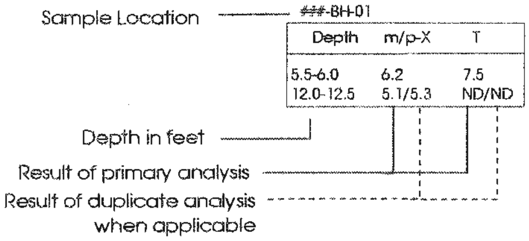
Figure 3



Legend

● Soil and groundwater sampling location

The following represents a hypothetical sampling point and defines the characters associated with that point:



UST - Underground storage tank

○ UST access port

▨ Concrete slab

⊟ Storm Drain Catch Basin

See Figure 2 for description of site features and origin of base map.

Notes

Concentrations of analytes detected are presented; analytes not detected are not presented or are presented as ND (not detected). TPHg was analyzed using Modified EPA Method 8015, all other analytes were analyzed using EPA Method 8260.

Results in micrograms/liter (ug/L) for all compounds except TPHg which is presented in milligrams/liter (mg/L).

RL = Reporting Limit

Each sample was analyzed for the following:

MTBE = Methyl Tertiary Butyl Ether (RL = 0.5 ug/L)
TPHg = Total Petroleum Hydrocarbons as Gasoline (RL = 0.05 mg/L)
B = Benzene (RL = 0.5 ug/L)
T = Toluene (RL = 0.5 ug/L)
E = Ethyl Benzene (RL = 0.5 ug/L)
m/p-X = meta/para-Xylenes (RL = 0.5 ug/L)
o-X = ortho-Xylene (RL = 0.5 ug/L)
DIPE = Di-isopropyl Ether (RL = 1 ug/L)
ETBE = Ethyl Tertiary Butyl Ether (RL = 1 ug/L)
TAME = Tertiary Amyl Methyl Ether (RL = 1 ug/L)
TBA = Tertiary Butyl Alcohol (RL = 10 ug/L)

Site #145

Summary of Chemical Analysis Results for Groundwater Samples

Santa Clara Valley Water District

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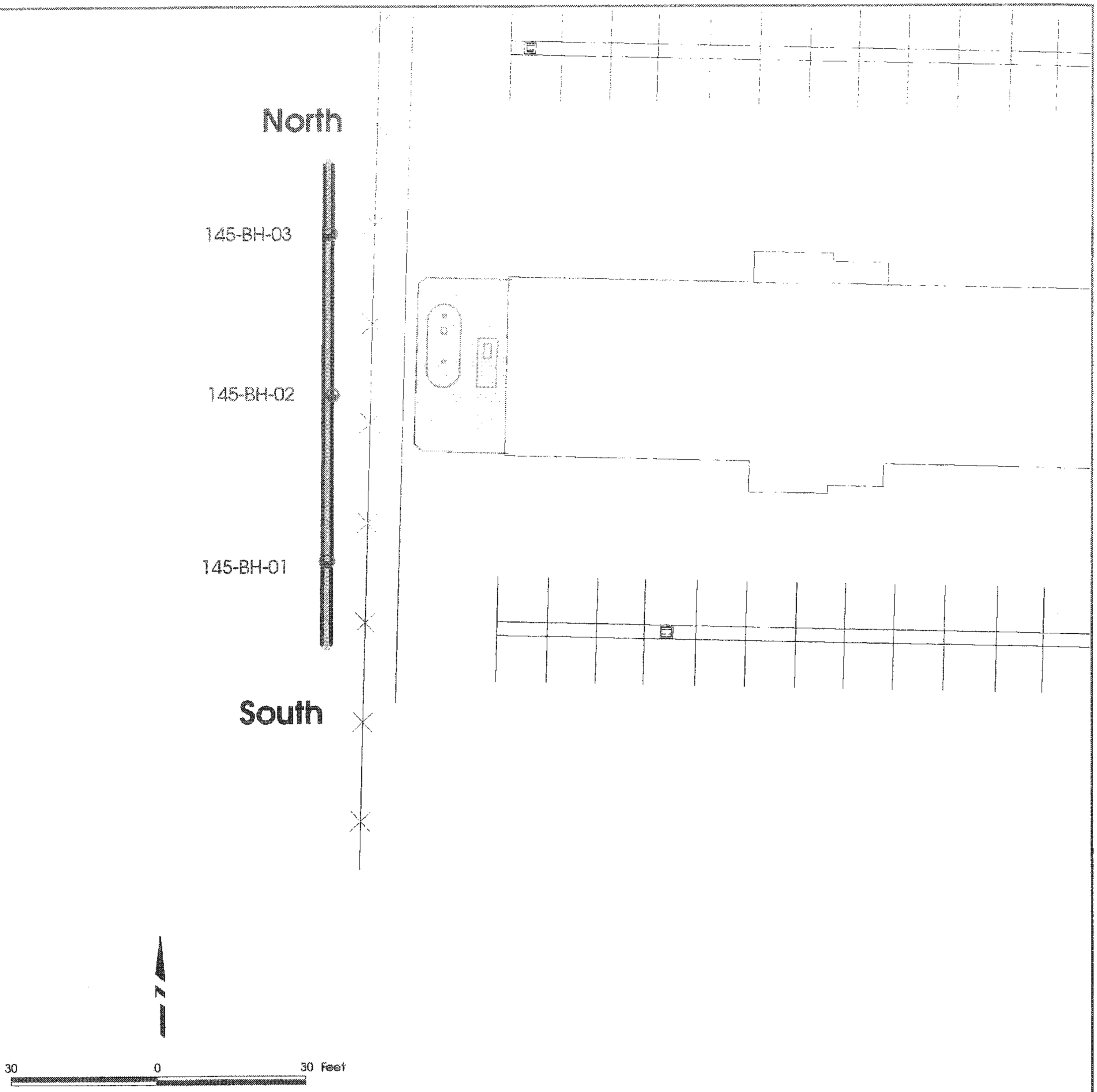
Figure 4



Legend

UST - Underground storage tank

○ UST access port

▭ Concrete slab

▣ Storm Drain Catch Basin

◒ Soil and groundwater sampling location

See Figure 2 for description of site features and origin of base map.

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Site #145

Site Plan Showing Orientation of Vertical Profile

Santa Clara Valley Water District

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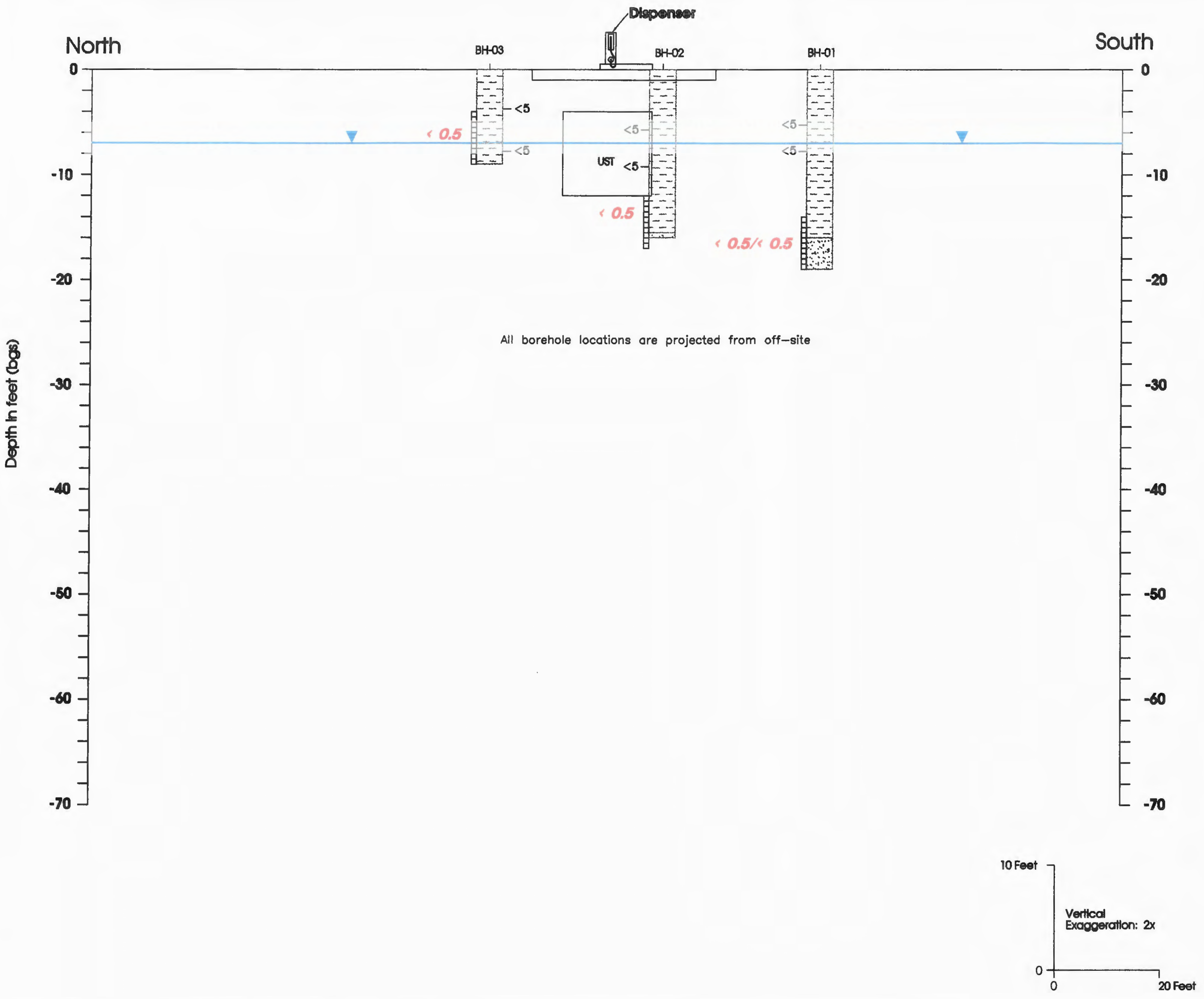
Figure 5



Legend and Abbreviations

<5	Concentration of MTBE detected in soil sample (µg/kg)
▼	Shallowest measured depth to groundwater
‹ 0.5/‹ 0.5	Concentrations of MTBE detected in primary and duplicate groundwater samples (µg/l)
UST	Underground storage tank
BH-01	Borehole location

Borehole

Soil sample location

Temporary monitoring well screen

▤	Clay, Silty Clay
▨	Sand, Gravelly Sand, Silty Sand

NOTE: All borehole locations are projected from off-site

Site #145

Vertical Profile Schematic

Santa Clara Valley Water District

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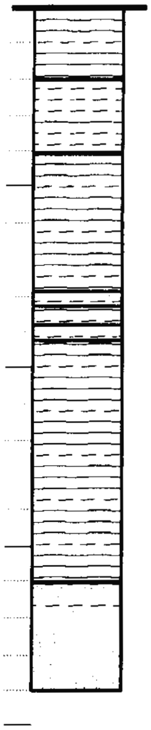
Figure 6

J:\ENGC...\6730\CM\#145.DWG 04/30/99 x–sec.PCP

SCVWD PILOT STUDY



Depth, feet	Water Level	PID Reading (ppm)	Lithologic Description	Sample Interval
		0.0	SILTY CLAY (CL), very dark gray to black, moist, soft to medium stiff, high plasticity.	
			CLAYEY SILT (ML), pale brown, slightly moist, friable.	
		0.0		
5			SILTY CLAY (CL), gray, moist, stiff, medium plasticity, moderately sandy (fine sand).	
		0.0		
			Sandy silt interbeds, very moist to wet.	
10		0.0	SILTY CLAY (CL), grayish brown to dark grayish brown, moist, stiff, medium to high plasticity, minor sand (fine sand).	
		0.0	Color grades to grayish brown mottled with reddish brown.	
15			Increasing sand content, more soft and increasing moisture.	
		0.0	SAND (SP), dark greenish gray, fine to coarse sand, saturated, some silt.	
		0.0	BOTTOM OF BORING AT 19 FEET.	
20				
25				
30				
35				

REGISTERED GEOLOGIST
JENIFER J. BEATTY
No. 6650
Exp. 4/30/01
STATE OF CALIFORNIA

Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: January 22, 1999
LFR Geologist: Thomas Zakaria, R.G., CH.G.

EXPLANATION

▤ Clay
▭ Silt
░ Sand
▨ Gravel

PID - Photoionization Detector

▼ Water level at time of drilling

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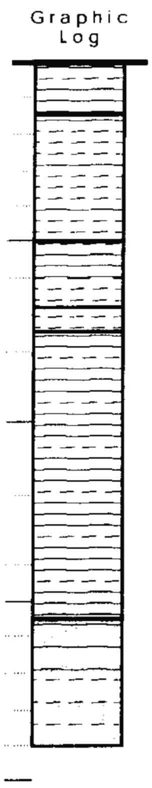
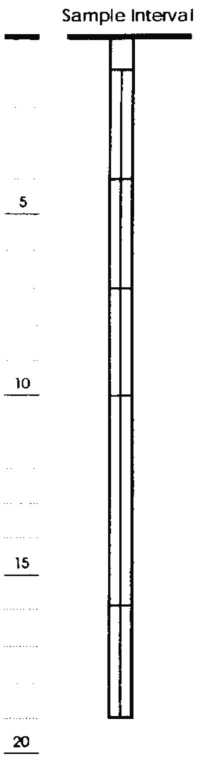
LITHOLOGY FOR 145-BH-01 *(page 1 of 1)*

Project No. 6730.00-024

SCVWD PILOT STUDY





Depth, feet	Water Level	PID Reading (ppm)	Lithologic Description
			SILTY CLAY (CL), very dark gray to black, moist, soft to medium stiff, high plasticity.
		0.0	CLAYEY SILT (ML), pale brown, slightly moist, friable.
		0.0	
5			SILTY CLAY - CLAYEY SILT (CL-ML), gray, moist, medium stiff, medium plasticity, some sand.
		0.0	SILTY SAND (SM), very moist, interbed.
10		0.0	SILTY CLAY (CL), grayish brown to dark brown, mottled, moist, stiff, medium to high plasticity, slightly sandy (fine sand).
		0.0	
15			
		0.0	CLAYEY/SILTY-SAND (SC-SM), dark gray, saturated, fine to medium coarse sand.
			BOTTOM OF BORING AT 19 FEET.
20			
25			
30			
35			

Jennifer J. [illegible]

No. 6650

Exp. 4/30/01

Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: January 22, 1999
LFR Geologist: Thomas Zakaria, R.G., CH.G.

EXPLANATION

- ☰ Clay
- ┅ Silt
- ░ Sand
- ▒ Gravel

PID - Photoionization Detector

▼ Water level at time of drilling

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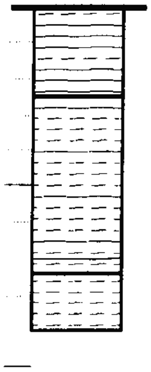
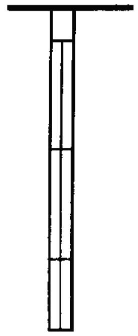
LITHOLOGY FOR 145-BH-02 *(page 1 of 1)*

Project No. 6730.00-024

SCVWD PILOT STUDY





Depth, feet	Water Level	PID Reading (ppm)	Lithologic Description
		0.0	SILTY CLAY (CL), very dark gray to black, moist, soft to medium stiff, high plasticity.
			CLAYEY SILT (ML), pale brown to gray, slightly moist, medium stiff, medium plasticity.
		0.0	
5			-friable.
		0.0	
			-clayey.
			SANDY SILT (ML-SM), greenish gray, wet/saturated, loose, fine to coarse sand, slight clayey.
		0.0	
10			BOTTOM OF BORING AT 9 FEET.
15			
20			
25			
30			
35			

REGISTERED GEOLOGIST
JENIFER J. BEATTY
No. 6650
Exp. 4/30/01
STATE OF CALIFORNIA

Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: January 22, 1999
LFR Geologist: Thomas Zakaria, R.G., CH.G.

EXPLANATION

☰ Clay
⚏ Silt
░ Sand
▒ Gravel

PID - Photoionization Detector

▼ Water level at time of drilling

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LITHOLOGY FOR 145-BH-03 *(page 1 of 1)*

Project No. 6730.00-024

SANTA CLARA VALLEY WATER DISTRICT
Pilot Study of Operating Underground Storage Tanks
Santa Clara County, California

Site Report

SITE NUMBER 153

Valley Automated Fuels
2132 O'Toole Avenue
San Jose, California 95121

April 30, 1999

This Site Report is one of a series of reports prepared for the Santa Clara Valley Water District's Pilot Study of Operating Underground Storage Tanks. The District funded this study to assess if MtBE is being released from UST systems that meet 1998 federal- and state-mandated upgrade requirements. The District will use the results of the Pilot Study, and possibly information obtained during subsequent investigations, to evaluate whether up-graded UST systems that handle MtBE are protective of groundwater quality, and ultimately drinking water. This Study and other District groundwater vulnerability assessments are critical in formulating a plan to protect drinking water supplies into the future.

With assistance from the San Jose Fire Department, LFR Levine·Fricke completed a file review and conducted soil and groundwater sampling adjacent to this site on behalf of the District. This report provides a brief summary of investigation findings, and site-specific data in tables, figures, and appendices. This Site Report is appended to the Summary Report for the Study.

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Emeryville, California 94608-1827
(510) 652-4500/Fax (510) 652-2246

SUMMARY OF FINDINGS

SITE DESCRIPTION

Figure 1 illustrates the site location. Site geology consists primarily of clays to approximately 37 feet below ground surface (bgs). The shallowest depth to groundwater measured was approximately 14 feet bgs.

SYSTEM DESCRIPTION

The UST system at this site consists of three 12,000-gallon double-walled gasoline USTs constructed of steel, and three diesel USTs. Piping construction for the site's gasoline USTs consists of trench-lined fiberglass piping. The UST system utilizes automatic line leak detection for piping leak detection, and automatic tank gauging, manual inventory reconciliation and continuous interstitial monitoring for UST leak detection. Field observations indicate UST system utilizes a balanced vapor recovery system.

RESULTS

MtBE was detected in 1 of the 12 soil samples collected at a concentration of 8.3 μg/kg. MtBE was not detected in any of the 5 groundwater samples collected. Toluene was detected in all of the soil samples at concentrations ranging from 7.6 μg/kg to 13 μg/kg.

SITE SELECTION CRITERIA MET

1998 upgrade compliant?	Yes
On SCVWD fuel leak database?	No
Status:	Not applicable
Distance from LUST site:	Greater than 250 feet
Distance to water supply well:	Less than 2000 feet
Access granted?	No
SCVWD approved?	Yes

FILE REVIEW SUMMARY

Number of tanks:	6
Reported release?	No
Release date:	Not applicable
Fuel released:	Not applicable
Location:	Not applicable
Quantity (gallons):	Not applicable
Data available:	Not applicable
Comments:	

SITE VISIT - UST SYSTEM INFORMATION

UST system inspection not conducted for off-site investigations.

SITE INSPECTION

Site inspection not conducted for off-site investigations.

UST SYSTEM DATA FROM FORM B COLLECTED DURING FILE REVIEWS - TANK ID # 4

Date installed:	1/12/84
Tank capacity (gallons):	12,000
Tank contents:	Regular unleaded
Tank construction:	
Type of system:	Double wall
Tank material (primary tank):	Bare steel
Lining compatible with 100% methanol:	No
Exterior corrosion protection:	Coating
Date spill containment installed:	1984/92
Date overfill protection equipment installed:	1984/92
Drop tube:	Not noted
Striker plate:	Not noted
Dispenser containment:	Not noted
Piping information:	
System type:	Pressure, underground
Construction:	Lined trench, underground
Material and corrosion protection:	Fiberglass pipe, underground
Leak detection:	Automatic line leak detector
Tank leak detection?	Manual inventory reconciliation Automatic tank gauging Continuous interstitial monitoring

UST SYSTEM DATA FROM FORM B COLLECTED DURING FILE REVIEWS - TANK ID # 5

Date installed:	1/12/84
Tank capacity (gallons):	12,000
Tank contents:	Midgrade unleaded
Tank construction:	
Type of system:	Double wall
Tank material (primary tank):	Bare steel

Lining compatible with 100% methanol:	No
Exterior corrosion protection:	Coating
Date spill containment installed:	1984/92
Date overfill protection equipment installed:	1984/92
Drop tube:	Not noted
Striker plate:	Not noted
Dispenser containment:	Not noted
Piping information:	
System type:	Pressure, underground
Construction:	Lined trench, underground
Material and corrosion protection:	Fiberglass pipe, underground
Leak detection:	Automatic line leak detector
Tank leak detection?	Manual inventory reconciliation Automatic tank gauging Continuous interstitial monitoring

UST SYSTEM DATA FROM FORM B COLLECTED DURING FILE REVIEWS - TANK ID # 6

Date installed:	1/12/84
Tank capacity (gallons):	12,000
Tank contents:	Premium unleaded
Tank construction:	
Type of system:	Double wall
Tank material (primary tank):	Bare steel
Lining compatible with 100% methanol:	No
Exterior corrosion protection:	Coating
Date spill containment installed:	1984/92
Date overfill protection equipment installed:	1984/92
Drop tube:	Not noted
Striker plate:	Not noted
Dispenser containment:	Not noted
Piping information:	
System type:	Pressure, underground
Construction:	Lined trench, underground
Material and corrosion protection:	Fiberglass pipe, underground
Leak detection:	
Tank leak detection?	Manual inventory reconciliation Automatic tank gauging Continuous interstitial monitoring

Table 1
Summary of Chemical Analysis Results for Soil Samples - Site #153
Santa Clara Valley Water District

Location	Date Sampled	Depth (ft bgs)	Methyl Tertiary Butyl Ether (MTBE) ug/Kg	TPH as Gasoline (TPHg) mg/Kg	Benzene (B) ug/Kg	Toluene (T) ug/Kg	Ethyl Benzene (E) ug/Kg	meta/para-Xylenes (m/p-X) ug/Kg	ortho-Xylene (o-X) ug/Kg	Di-isopropyl Ether (DIPE) ug/Kg	Ethyl Tertiary Butyl Ether (ETBE) ug/Kg	Tertiary Amyl Methyl Ether (TAME) ug/Kg	Tertiary Butyl Alcohol (TBA) ug/Kg
153-BH-01	03/15/99	7.0-7.5	<5	<1	<5	9.5	<5	<5	<5	<20	<20	<20	<200
		12.0-12.5	<5	<1	<5	9.9	<5	<5	<5	<20	<20	<20	<200
		36.5-37.0	<5	<1	<5	12	<5	<5	<5	<20	<20	<20	<200
153-BH-02	03/15/99	10.0-10.5	<5	<1	<5	8.9	<5	<5	<5	<20	<20	<20	<200
		13.5-14.0	<5	<1	<5	9.8	<5	<5	<5	<20	<20	<20	<200
		34.0-34.5	<5	<1	<5	7.6	<5	<5	<5	<20	<20	<20	<200
153-BH-03	03/16/99	11.5-12.0	<5	<1	<5	13	<5	<5	<5	<20	<20	<20	<200
		21.0-21.5	8.3	<1	<5	12	<5	<5	<5	<20	<20	<20	<200
		26.5-27.0	<5	<1	<5	11	<5	<5	<5	<20	<20	<20	<200
153-BH-04	03/16/99	8.5-9.0	<5	<1	<5	13	<5	<5	<5	<20	<20	<20	<200
		13.5-14.0	<5	<1	<5	10	<5	<5	<5	<20	<20	<20	<200
		28.0-28.5	<5	<1	<5	10	<5	<5	<5	<20	<20	<20	<200

Table proofed by CLC .

Notes:

All samples were analyzed by Alpha Analytical, Inc. of Sparks, NV, using EPA Method 8260 for MTBE, BTEX, DIPE, ETBE, TAME, and TBA, and Modified EPA Method 8015 for TPHg.

ft bgs = feet below ground surface

mg/Kg = milligrams per kilogram

TPH = total petroleum hydrocarbons

ug/Kg = micrograms per kilogram

Data Qualifiers (if shown on table):

J = Estimated value

UJ =Not detected at the estimated reporting limit shown

Table 2
Summary of Chemical Analysis Results for Groundwater Samples - Site # 153
Santa Clara Valley Water District

Location	Date Sampled	Depth (ft bgs)	Methyl Tertiary Butyl Ether (MTBE) ug/L	TPH as Gasoline (TPHg) mg/L	Benzene (B) ug/L	Toluene (T) ug/L	Ethyl Benzene (E) ug/L	meta/para-Xylenes (m/p-X) ug/L	ortho-Xylene (o-X) ug/L	Di-isopropyl Ether (DIPE) ug/L	Ethyl Tertiary Butyl Ether (ETBE) ug/L	Tertiary Amyl Methyl Ether (TAME) ug/L	Tertiary Butyl Alcohol (TBA) ug/L
153-BH-01	03/15/99	37.0-37.5	<0.5	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<10
153-BH-02	03/15/99	37.0-37.5	<0.5	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<10
153-BH-02-DUP		37.0-37.5	<0.5	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<10
153-BH-03	03/16/99	30.0-40.0	<0.5	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<10
153-BH-04	03/16/99	27.0-37.0	<0.5	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<10

Table proofed by CLC.

Notes:

All primary and field duplicate (-DUP) samples were analyzed by Alpha Analytical, Inc. of Sparks, NV, using EPA Method 8260 for MTBE, BTEX, DIPE, ETBE, TAME, and TBA, and Modified EPA Method 8015 for TPHg.

ft bgs = feet below ground surface

mg/L = milligrams per liter

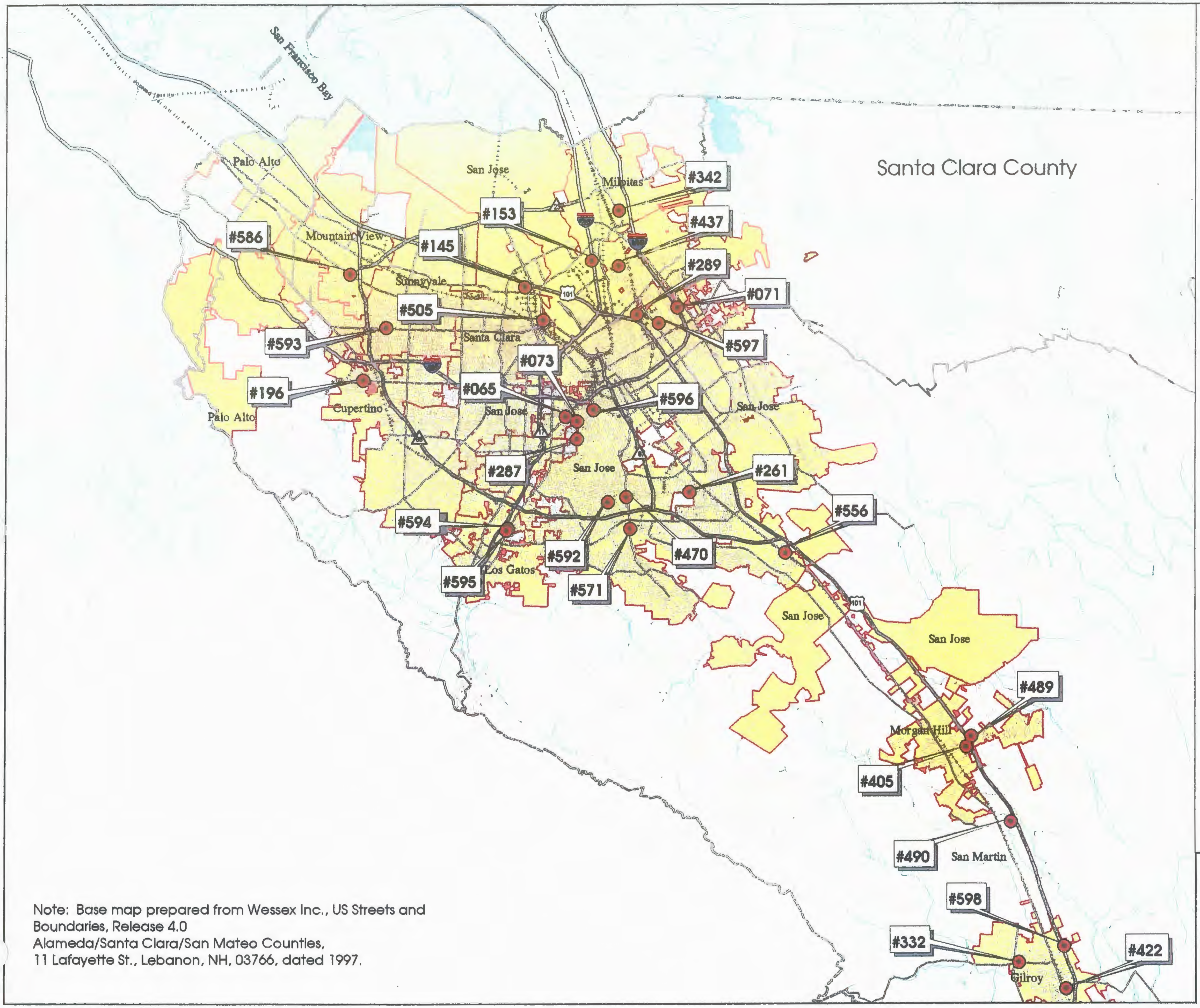
TPH = total petroleum hydrocarbons

ug/L = micrograms per liter

Data Qualifiers (if shown on table):

J = Estimated value

UJ =Not detected at the estimated reporting limit shown



Note: Base map prepared from Wessex Inc., US Streets and Boundaries, Release 4.0
Alameda/Santa Clara/San Mateo Counties,
11 Lafayette St., Lebanon, NH, 03766, dated 1997.

Santa Clara Valley Water District
Pilot Study Sites

Santa Clara Valley Water District

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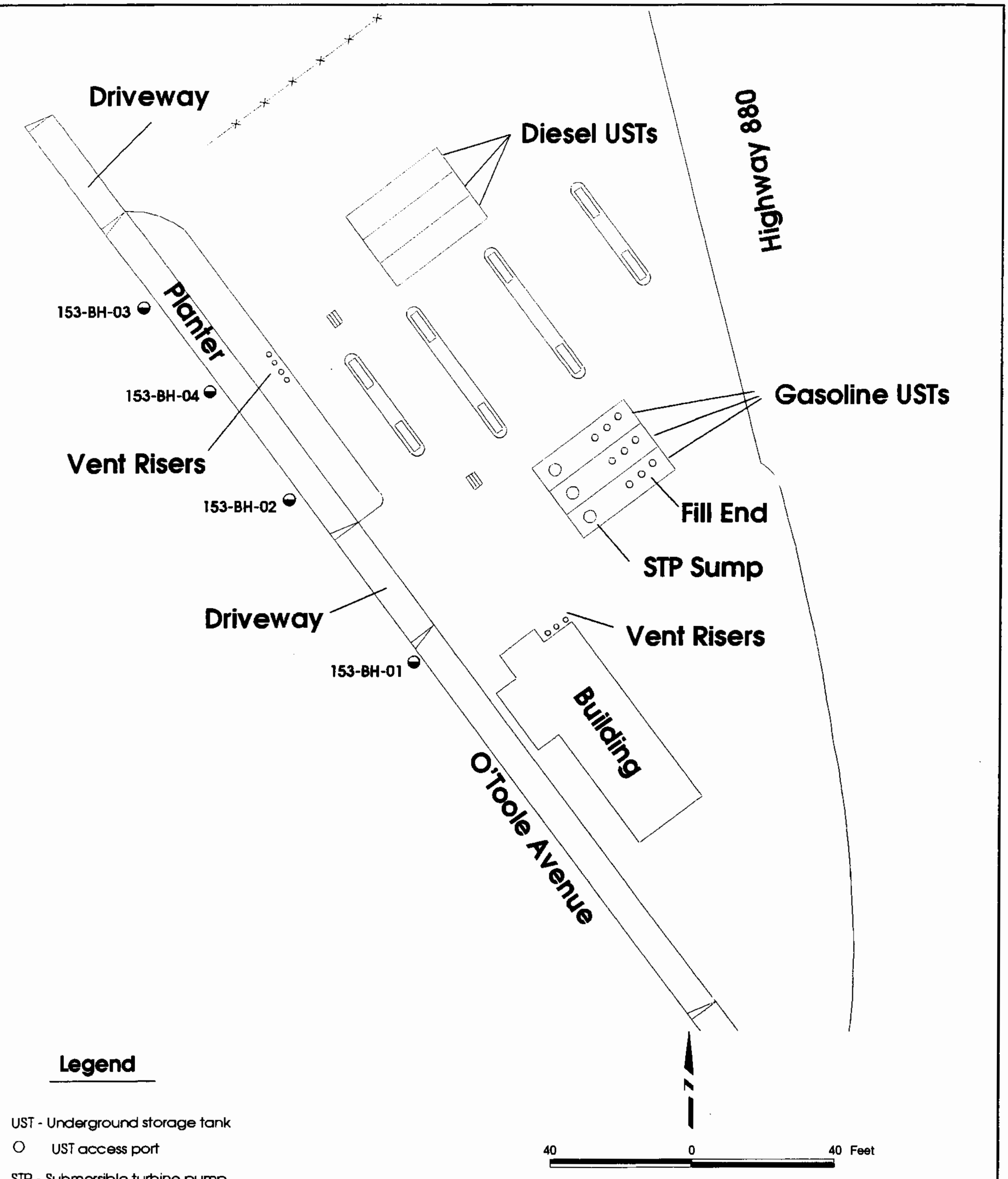
Figure 1



Legend

UST - Underground storage tank

○ UST access port

STP - Submersible turbine pump

▤ Storm Drain Catch Basin

● Soil and groundwater sampling location

Note: Base map prepared from LFR field plan.

u:/scvwd/gis/153.apr

Site #153

Site Plan

Santa Clara Valley Water District

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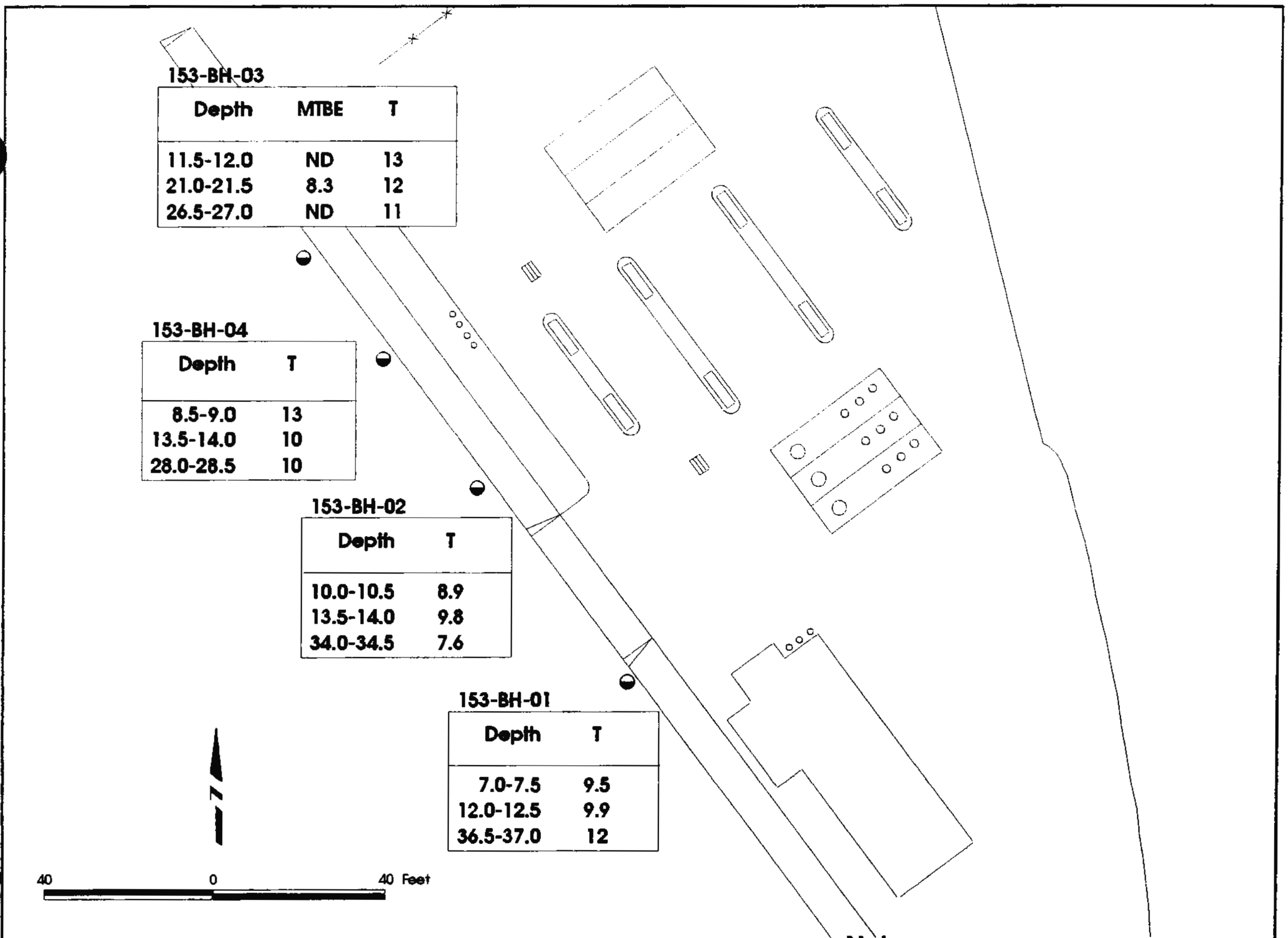
Figure 2



153-BH-03

Depth	MTBE	T
11.5-12.0	ND	13
21.0-21.5	8.3	12
26.5-27.0	ND	11

153-BH-04

Depth	T
8.5-9.0	13
13.5-14.0	10
28.0-28.5	10

153-BH-02

Depth	T
10.0-10.5	8.9
13.5-14.0	9.8
34.0-34.5	7.6

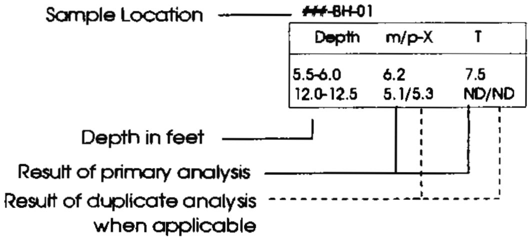
153-BH-01

Depth	T
7.0-7.5	9.5
12.0-12.5	9.9
36.5-37.0	12

Legend

◓ Soil and groundwater sampling location

The following represents a hypothetical sampling point and defines the characters associated with that point:


Sample Location
###-BH-01
Depth in feet
Result of primary analysis
Result of duplicate analysis when applicable

Depth	m/p-X	T
5.5-6.0	6.2	7.5
12.0-12.5	5.1/5.3	ND/ND

UST - Underground storage tank

○ UST access port

▤ Storm Drain Catch Basin

See Figure 2 for description of site features and origin of base map.

Notes

Concentrations of analytes detected are presented; analytes not detected are not presented or are presented as ND (not detected). TPHg was analyzed using Modified EPA Method 8015, all other analytes were analyzed using EPA Method 8260.

Results in micrograms/kilogram (ug/Kg) for all compounds except TPHg which is presented in milligrams/kilogram (mg/Kg).

RL = Reporting Limit

Each sample was analyzed for the following:

MTBE = Methyl Tertiary Butyl Ether (RL = 5 ug/Kg)
TPHg = Total Petroleum Hydrocarbons as Gasoline (RL = 1 mg/Kg)
B = Benzene (RL = 5 ug/Kg)
T = Toluene (RL = 5 ug/Kg)
E = Ethyl Benzene (RL = 5 ug/Kg)
m/p-X = meta/para-Xylenes (RL = 5 ug/Kg)
o-X = ortho-Xylene (RL = 5 ug/Kg)
DIPE = Di-isopropyl Ether (RL = 20 ug/Kg)
ETBE = Ethyl Tertiary Butyl Ether (RL = 20 ug/Kg)
TAME = Tertiary Amyl Methyl Ether (RL = 20 ug/Kg)
TBA = Tertiary Butyl Alcohol (RL = 200 ug/Kg)

Site #153

Summary of Chemical Analysis Results for Soil Samples

Santa Clara Valley Water District

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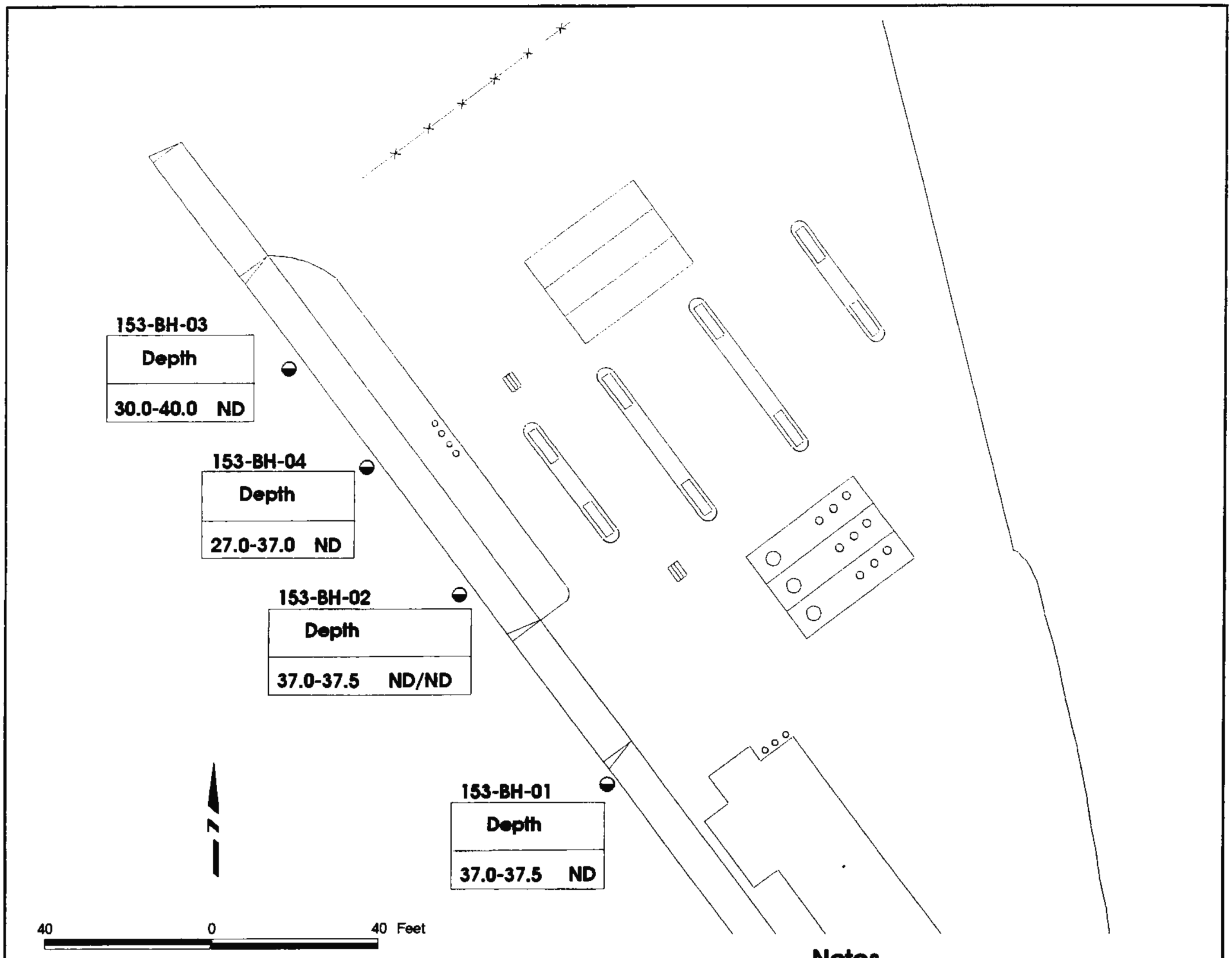
Figure 3



Notes

Concentrations of analytes detected are presented; analytes not detected are not presented or are presented as ND (not detected). TPHg was analyzed using Modified EPA Method 8015, all other analytes were analyzed using EPA Method 8260.

Results in micrograms/liter (ug/L) for all compounds except TPHg which is presented in milligrams/liter (mg/L).

RL = Reporting Limit

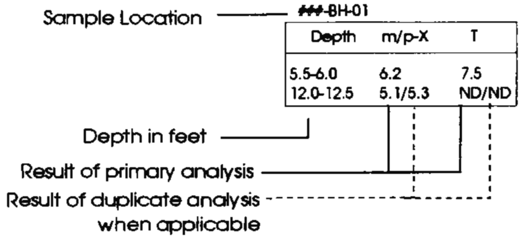
Each sample was analyzed for the following:

MTBE = Methyl Tertiary Butyl Ether (RL = 0.5 ug/L)
TPHg = Total Petroleum Hydrocarbons as Gasoline (RL = 0.05 mg/L)
B = Benzene (RL = 0.5 ug/L)
T = Toluene (RL = 0.5 ug/L)
E = Ethyl Benzene (RL = 0.5 ug/L)
m/p-X = meta/para-Xylenes (RL = 0.5 ug/L)
o-X = ortho-Xylene (RL = 0.5 ug/L)
DIPE = Di-isopropyl Ether (RL = 1 ug/L)
ETBE = Ethyl Tertiary Butyl Ether (RL = 1 ug/L)
TAME = Tertiary Amyl Methyl Ether (RL = 1 ug/L)
TBA = Tertiary Butyl Alcohol (RL = 10 ug/L)

Legend

● Soil and groundwater sampling location

The following represents a hypothetical sampling point and defines the characters associated with that point:



UST - Underground storage tank

○ UST access port

▤ Storm Drain Catch Basin

See Figure 2 for description of site features and origin of base map.

Site #153

Summary of Chemical Analysis Results for Groundwater Samples

Santa Clara Valley Water District

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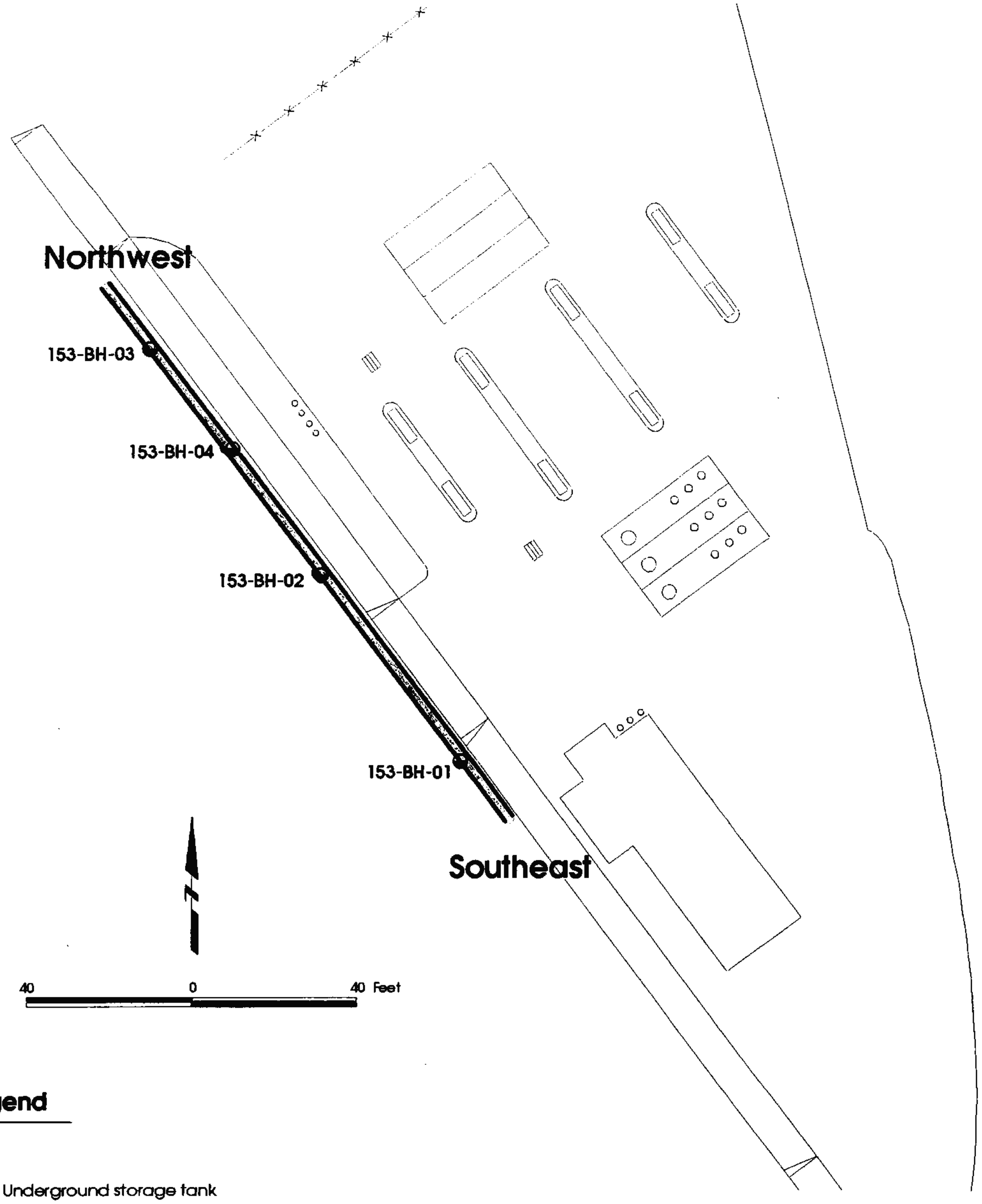
Figure 4



Legend

UST - Underground storage tank

○ UST access port

▤ Storm Drain Catch Basin

◒ Soil and groundwater sampling location

See Figure 2 for description of site features and origin of base map.

Site #153

Site Plan Showing Orientation of Vertical Profile

Santa Clara Valley Water District

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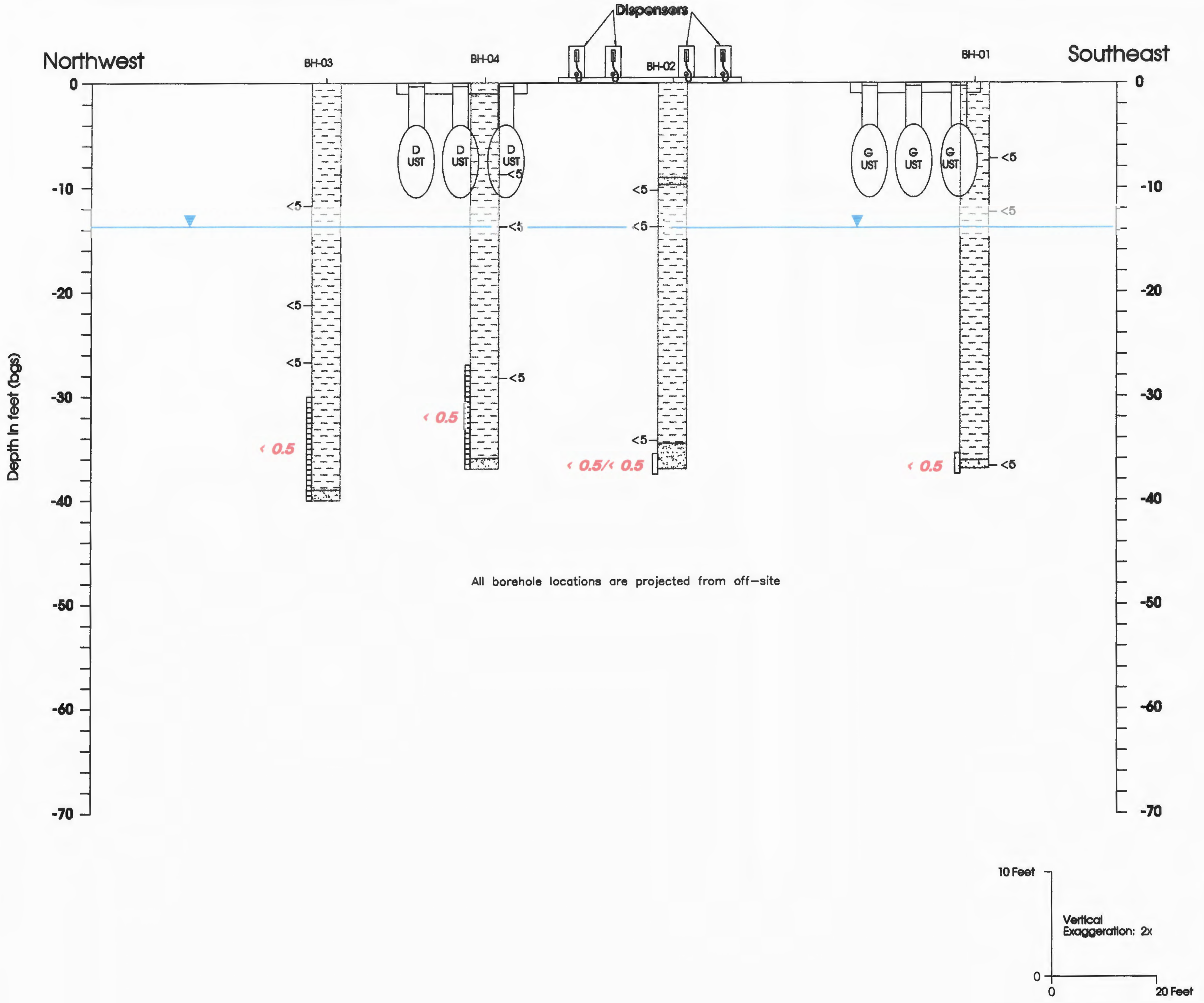
Figure 5



Legend and Abbreviations

<5	Concentration of MTBE detected in soil sample (µg/kg)
▼	Shallowest measured depth to groundwater
< 0.5/< 0.5	Concentrations of MTBE detected in primary and duplicate groundwater samples (µg/l)
D	Diesel
G	Gas
UST	Underground storage tank
BH-01	Borehole location

Borehole

- Soil sample location
- Groundwater sample location
- Temporary monitoring well screen

▤	Clay, Silty Clay
▨	Sand, Gravelly Sand, Silty Sand

NOTE: All borehole locations are projected from off-site

Site #153

Vertical Profile Schematic

Santa Clara Valley Water District

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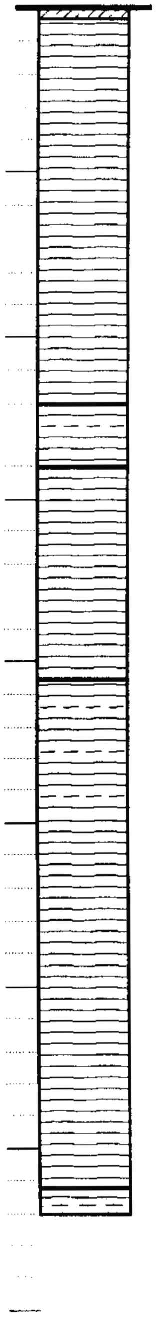
Figure 6

J:\ENGCAD\6730\CM#153.DWG 04/30/99 x–sec.PCP

SCVWD PILOT STUDY



Depth, feet	Water Level	PID Reading (ppm)	Lithologic Description	Sample Interval
			3" thick ASPHALT.	
			CLAY (CL), light brown, moist, soft, medium plasticity, some silt, uniform to grayish brown.	
5				5
		0.0		
		0.0	Lighter color, more yellowish brown, medium to high plasticity.	
10				10
		0.0		
			SANDY SILTY CLAY (CL), grayish brown, very moist, soft, high plasticity, 30% fine sand and silt.	
		0.0	CLAY (CL), olive-brown mottled to very dark gray, moist, medium stiff, high plasticity.	
15				15
		0.0		
			Very dark brownish gray mottled 10% olive-brown, very stiff, medium plasticity.	
20				20
			SILTY CLAY (CL), yellowish brown mottled 30% dark gray, slightly moist, very stiff, low plasticity.	
		0.0	70% olive-gray with depth, no silt.	
25			Clay.	25
		0.0	Light yellowish to olive-brown mottled 30% light gray, very stiff to hard.	
30				30
		0.0		
35				35
		0.0	CLAYEY SILTY SAND (SM), grayish brown, moist, dense, poorly graded, very fine sand, 35% fines. Uniform, subrounded.	
			BOTTOM OF BORING AT 37 FEET.	
40				40

Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: March 15, 1999
LFR Geologist: Todd Miller, R.G., CH.G.

JENIFER J. BEATTY
No. 6650
Exp. 4/30/01

EXPLANATION

▤ Clay

┅ Silt

░ Sand

▒ Gravel

PID - Photoionization Detector

▼ Water level at time of drilling

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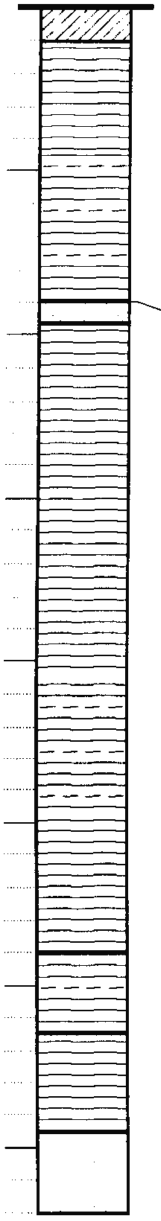
LITHOLOGY FOR 153-BH-01 *(page 1 of 1)*

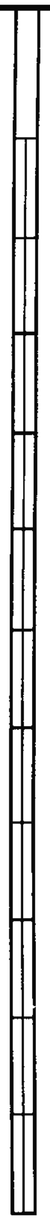
Project No. 6730.00-030

SCVWD PILOT STUDY



Depth, feet	Water Level	PID Reading (ppm)	Lithologic Description
			12" thick ASPHALT.
5		0.0	SILTY CLAY (CL), grayish brown, slightly moist, stiff, medium plasticity.
		0.0	
			SILTY CLAY (CL), pale yellowish brown and grayish brown, slightly moist, medium stiff, low plasticity, friable, rare minute vertical pores, less silty, higher plasticity with depth.
10			SAND (SP), brownish gray, wet, medium dense, fine grained, very thin interval at 10 feet.
		0.0	
			CLAY (CL), grayish brown mottled 20% gray, moist, very soft, very high plasticity.
	▼ ATD		Silty with depth.
15		0.0	
			CLAY (CL), olive-brown mottled 15% dark gray, slightly moist, very stiff, low plasticity.
		0.0	
			Predominantly dark gray.
20			
			Olive-brown mottled with gray (20%) and pale grayish brown (10%).
		0.0	Yellowish brown mottled 30% gray.
			Olive mottled 30% bluish gray, some plant material in gray areas, occasional pale gray to white portions.
25			
		0.0	Lighter color with depth. Pale olive-brown mottled with light gray. Dark olive-brown.
30			SILTY CLAY (CL), olive-brown mottled gray, very moist, soft, medium plasticity.
		0.0	CLAY (CL), yellowish brown mottled (20%) gray, slightly moist, stiff, low plasticity, 75% gray with depth.
35			SAND (SP), brownish gray, saturated, dense, fine grained, subround, clean, uniform.
		0.0	BOTTOM OF BORING AT 37 FEET.
40			

Sample Interval



Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: March 15, 1999
LFR Geologist: Todd Miller, R.G., CH.G.

No. 6650
Exp. 4/30/01

EXPLANATION

▤	Clay
☰	Silt
☐	Sand
▨	Gravel

PID - Photoionization Detector

▼ Water level at time of drilling

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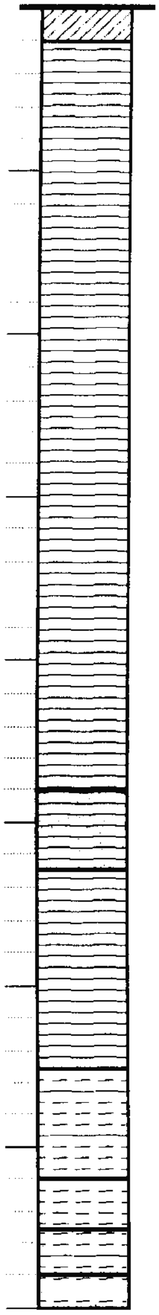
LITHOLOGY FOR 153-BH-02 *(page 1 of 1)*

Project No. 6730.00-030

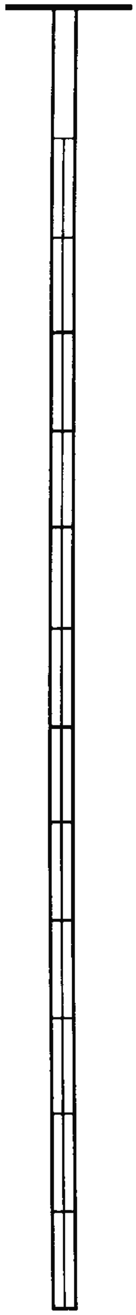
SCVWD PILOT STUDY



Depth, feet	Water Level	PID Reading (ppm)	Lithologic Description
			12" thick ASPHALT.
5		0.0	CLAY (CL), light brown, faint mottling, moist, medium stiff, medium plasticity, rare minute vertical pores.
		0.0	
			CLAY (CL), yellowish brown mottled 10% brownish gray, moist, very soft, high plasticity.
10			
		0.0	
15		0.0	CLAY (CL), grayish brown mottled 20% gray, slightly moist, stiff, medium plasticity.
		0.0	
20	▼ ATD		CLAY (CL), olive-brown mottled 50% yellowish brown, dark gray, and pale brown, slightly moist, very stiff, low plasticity, common plant remnants and root channels in dark gray portions.
		0.0	
25			SANDY CLAY (CL), olive-brown heavily mottled pale brown, reddish brown, yellowish brown, dark gray, slightly moist, very stiff, 10% medium sand.
		0.0	CLAY (CL), olive, mottled 50% gray and light gray, slightly moist, very stiff, low plasticity.
30			Light olive-brown mottled olive-gray.
		0.0	CLAYEY SILT (ML), olive to yellowish brown mottled 40% bluish gray, slightly moist, medium stiff, medium plasticity.
35			Brownish olive mottled 20% dark gray, moist, soft, low plasticity, some very fine sand. SILT (ML), olive, saturated, very soft, some clay, liquid behavior.
		0.0	
40			SANDY CLAYEY SILT (ML), brownish olive mottled 20% gray, moist, medium stiff, high plasticity, distinct content with SILTY SAND (SM), dark olive-gray to bluish gray, moist, dense, very fine grained, subround, uniform.

BOTTOM OF BORING AT 40 FEET.

Sample Interval



Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: March 16, 1999
LFR Geologist: Todd Miller, R.G., CH.G.

EXPLANATION

☰	Clay	░	Sand
┅	Silt	▒	Gravel

PID - Photoionization Detector

▼ Water level at time of drilling

REGISTERED GEOLOGIST
JENNIFER J. BEATTY
No. 6650
Exp. 1/31/01

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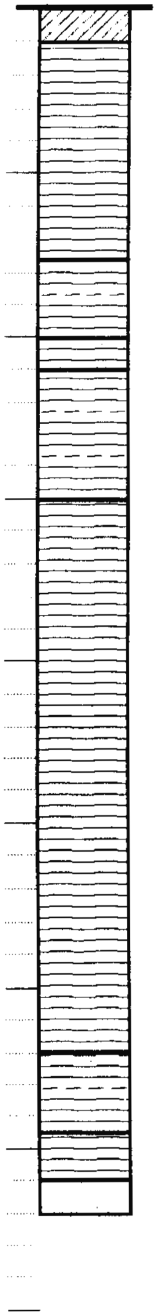
LITHOLOGY FOR 153-BH-03 *(page 1 of 1)*

Project No. 6730.00-030

SCVWD PILOT STUDY



Depth, feet	Water Level	PID Reading (ppm)	Lithologic Description
			12" thick ASPHALT.
5			CLAY (CL), grayish brown, moist, medium stiff, medium plasticity, faint mottling, common vertical holes up to 1 millimeter diameter.
		0.0	
		0.0	Slightly moist, low plasticity, blocky, no holes.
			SILTY CLAY (CL), yellowish brown mottled 10% grayish brown, moist, soft, low plasticity.
10			SANDY CLAY (CL), yellowish brown, slightly moist, medium stiff, medium plasticity, 10% coarse angular sand.
		0.0	SILTY CLAY (CL), yellowish brown mottled 40% grayish brown with black flecks, moist, very soft, medium to high plasticity.
			Less silt, stiffer with depth.
15		0.0	
			CLAY (CL), brownish olive mottled 25% grayish brown with veins of gray, slightly moist, stiff, medium to low plasticity.
		0.0	
	▼ ATD		Very stiff, low plasticity.
20			Brown mottled 30% gray and portions of light gray.
		0.0	Yellowish brown mottled 35% bluish gray.
			Olive mottled (35%) dark gray.
25			
		0.0	Dark gray mottled 30% olive-brown.
30			CLAY (CL), yellowish brown to olive-brown mottled 25% gray, slightly moist, very stiff, non plastic, very tight.
		0.0	SILTY CLAY (CL), bluish gray mottled 90% yellowish brown, moist, medium stiff, medium plasticity, mottling is sharp.
35			CLAY (CL), grayish brown mottled gray/yellowish brown, very moist, very soft, medium to high plasticity.
			SAND (SP), olive mottled olive-brown, moist, dense, very fine, some silt.
		0.0	BOTTOM OF BORING AT 37 FEET.
40			

Sample Interval

Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: March 16, 1999
LFR Geologist: Todd Miller, R.G., CH.G.

EXPLANATION

☰	Clay
┅	Silt
░	Sand
▒	Gravel

PID - Photoionization Detector

▼ Water level at time of drilling

JENNIFER J. BEATTY
No. 6650
4/30/01

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LITHOLOGY FOR 153-BH-04 *(page 1 of 1)*

Project No. 6730.00-030

SANTA CLARA VALLEY WATER DISTRICT

Pilot Study of Operating Underground Storage Tanks

Santa Clara County, California

Site Report

SITE NUMBER 196

Beacon
22510 Stevens Creek Boulevard
Cupertino, California 95014

April 30, 1999

This Site Report is one of a series of reports prepared for the Santa Clara Valley Water District's Pilot Study of Operating Underground Storage Tanks. The District funded this study to assess if MtBE is being released from UST systems that meet 1998 federal- and state-mandated upgrade requirements. The District will use the results of the Pilot Study, and possibly information obtained during subsequent investigations, to evaluate whether up-graded UST systems that handle MtBE are protective of groundwater quality, and ultimately drinking water. This Study and other District groundwater vulnerability assessments are critical in formulating a plan to protect drinking water supplies into the future.

With assistance from the Santa Clara County Fire Department, LFR Levine·Fricke completed a file review and conducted soil and groundwater sampling adjacent to this site on behalf of the District. This report provides a brief summary of investigation findings, and site-specific data in tables, figures, and appendices. This Site Report is appended to the Summary Report for the Study.

LFR
LEVINE·FRICKE
1900 Powell Street, 12th Floor
Emeryville, California 94608-1827
(510) 652-4500/Fax (510) 652-2246

SUMMARY OF FINDINGS

SITE DESCRIPTION

Figure 1 illustrates the site location. Site geology consists of alternating units of silty clays/clayey silts and silty gravels to approximately 35 feet below ground surface (bgs). The gravels were encountered from approximately 7 feet bgs to 16 to 22 feet bgs, and again at approximately 30 feet bgs. The shallowest depth to groundwater measured was approximately 25 feet bgs.

SYSTEM DESCRIPTION

Records indicate that the UST system at the site consists of three unlined, single-walled gasoline USTs constructed of fiberglass, with single-walled fiberglass piping (one 12,000 gallon, one 10,000 gallon and one 6,000 gallon-capacity UST). The UST system utilizes line tightness testing for piping leak detection and automatic tank gauging and statistical inventory reconciliation (SIR) for UST leak detection. Field observations indicate UST system utilizes a balanced vapor recovery system.

RESULTS

MtBE was detected in 7 of 15 soil samples and 4 of 6 groundwater samples collected from borings adjacent to the site. MtBE concentration in soil samples ranged from 9.1 μg/kg to 800 μg/kg. MtBE concentrations in groundwater samples ranged from 1.5 μg/l to 8.5 μg/l. Petroleum hydrocarbon constituents (ethylbenzene and xylenes) were detected in soil and groundwater. Ethylbenzene (48 μg/kg) and xylene (27 μg/kg) were detected in 1 of 15 soil samples, and xylene (0.51 μg/l) was detected in 1 of 6 groundwater samples. Tertiary butyl alcohol (TBA) was detected in one soil sample at a concentration of 330 μg/kg.

SITE SELECTION CRITERIA MET

1998 upgrade compliant?	Yes
On SCVWD fuel leak database?	No
Status:	Not applicable
Distance from LUST site:	Greater than 250 feet
Distance to water supply well:	Greater than 2000 feet
Access granted?	No
SCVWD approved?	Yes

FILE REVIEW SUMMARY

Number of tanks:	3
Reported release?	No
Release date:	Not applicable
Fuel released:	Not applicable
Location:	Not applicable
Quantity (gallons):	Not applicable
Data available:	Not applicable

Comments:

SITE VISIT - UST SYSTEM INFORMATION

UST system inspection not conducted for off-site investigations.

SITE INSPECTION

Site inspection not conducted for off-site investigations.

UST SYSTEM DATA FROM FORM B COLLECTED DURING FILE REVIEWS - TANK ID # 1

Date installed:	10/12/82
Tank capacity (gallons):	12,000
Tank contents:	Regular unleaded
Tank construction:	
Type of system:	Single wall
Tank material (primary tank):	Fiberglass
Lining compatible with 100% methanol:	No
Exterior corrosion protection:	None
Date spill containment installed:	Not noted
Date overfill protection equipment installed:	Not noted
Drop tube:	No
Striker plate:	No
Dispenser containment:	No
Piping information:	
System type:	Pressure, underground
Construction:	Single wall, underground
Material and corrosion protection:	Fiberglass pipe, underground
Leak detection:	Line tightness testing
Tank leak detection?	Automatic tank gauging SIR Monthly tank testing

UST SYSTEM DATA FROM FORM B COLLECTED DURING FILE REVIEWS - TANK ID # 2

Date installed:	10/12/82
Tank capacity (gallons):	10,000
Tank contents:	Midgrade unleaded
Tank construction:	
Type of system:	Single wall
Tank material (primary tank):	Fiberglass

Lining compatible with 100% methanol:	No
Exterior corrosion protection:	None
Date spill containment installed:	Not noted
Date overfill protection equipment installed:	Not noted
Drop tube:	Not noted
Striker plate:	Not noted
Dispenser containment:	Not noted
Piping information:	
System type:	Pressure, underground
Construction:	Single wall, underground
Material and corrosion protection:	Fiberglass pipe, underground
Leak detection:	Line tightness testing
Tank leak detection?	Automatic tank gauging Ground water monitoring SIR Monthly tank testing

UST SYSTEM DATA FROM FORM B COLLECTED DURING FILE REVIEWS - TANK ID # 3

Date installed:	10/12/82
Tank capacity (gallons):	6,000
Tank contents:	Premium unleaded
Tank construction:	
Type of system:	Single wall
Tank material (primary tank):	Fiberglass
Lining compatible with 100% methanol:	No
Exterior corrosion protection:	None
Date spill containment installed:	Not noted
Date overfill protection equipment installed:	Not noted
Drop tube:	No
Striker plate:	No
Dispenser containment:	No
Piping information:	
System type:	Pressure, underground
Construction:	Single wall, underground
Material and corrosion protection:	Fiberglass pipe, underground
Leak detection:	Line tightness testing
Tank leak detection?	Automatic tank gauging Ground water monitoring SIR Monthly tank testing

Table 1
Summary of Chemical Analysis Results for Soil Samples - Site #196
Santa Clara Valley Water District

Location	Date Sampled	Depth (ft bgs)	Methyl Tertiary Butyl Ether (MTBE) ug/Kg	TPH as Gasoline (TPHg) mg/Kg	Benzene (B) ug/Kg	Toluene (T) ug/Kg	Ethyl Benzene (E) ug/Kg	meta/para-Xylenes (m/p-X) ug/Kg	ortho-Xylene (o-X) ug/Kg	Di-isopropyl Ether (DIPE) ug/Kg	Ethyl Tertiary Butyl Ether (ETBE) ug/Kg	Tertiary Amyl Methyl Ether (TAME) ug/Kg	Tertiary Butyl Alcohol (TBA) ug/Kg
196-BH-01	03/08/99	14.0-14.5	9.1	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		18.0-18.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		25.0-25.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
196-BH-02	03/08/99	9.5-10.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		14.0-14.5	41	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		25.0-25.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
196-BH-03	03/09/99	6.0-6.5	130	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		11.0-11.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		15.5-16.0	<5	<1	<5	<5	48	27	<5	<20	<20	<20	<200
196-BH-04	03/09/99	6.0-6.5	600	<1	<5	<5	<5	<5	<5	<20	<20	<20	330
		10.5-11.0	12	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		16.0-16.5	76	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
196-BH-05	03/10/99	6.0-6.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		11.0-11.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		16.0-16.5	800	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200

Table proofed by CLC.

Notes:

All samples were analyzed by Alpha Analytical, Inc. of Sparks, NV, using EPA Method 8260 for MTBE, BTEX, DIPE, ETBE, TAME, and TBA, and Modified EPA Method 8015 for TPHg.

ft bgs = feet below ground surface

mg/Kg = milligrams per kilogram

TPH = total petroleum hydrocarbons

ug/Kg = micrograms per kilogram

Data Qualifiers (if shown on table):

J = Estimated value

UJ =Not detected at the estimated reporting limit shown

Table 2
Summary of Chemical Analysis Results for Groundwater Samples - Site # 196
Santa Clara Valley Water District

Location	Date Sampled	Depth (ft bgs)	Methyl Tertiary Butyl Ether (MTBE) ug/L	TPH as Gasoline (TPHg) mg/L	Benzene (B) ug/L	Toluene (T) ug/L	Ethyl Benzene (E) ug/L	meta/para-Xylenes (m/p-X) ug/L	ortho-Xylene (o-X) ug/L	Di-isopropyl Ether (DIPE) ug/L	Ethyl Tertiary Butyl Ether (ETBE) ug/L	Tertiary Amyl Methyl Ether (TAME) ug/L	Tertiary Butyl Alcohol (TBA) ug/L
196-BH-01	03/08/99	31.5	<0.5	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<10
196-BH-01-DUP		31.5	<0.5	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<10
196-BH-02	03/08/99	31.5	1.5	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<10
196-BH-03	03/09/99	36.0	6.6	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<10
196-BH-04	03/09/99	35.0	8.5	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<10
196-BH-05	03/10/99	35.0	1.8	<0.05	<0.5	<0.5	<0.5	0.51	<0.5	<1	<1	<1	<10

Table proofed by CLC.

Notes:

All primary and field duplicate (-DUP) samples were analyzed by Alpha Analytical, Inc. of Sparks, NV, using EPA Method 8260 for MTBE, BTEX, DIPE, ETBE, TAME, and TBA, and Modified EPA Method 8015 for TPHg.

ft bgs = feet below ground surface

mg/L = milligrams per liter

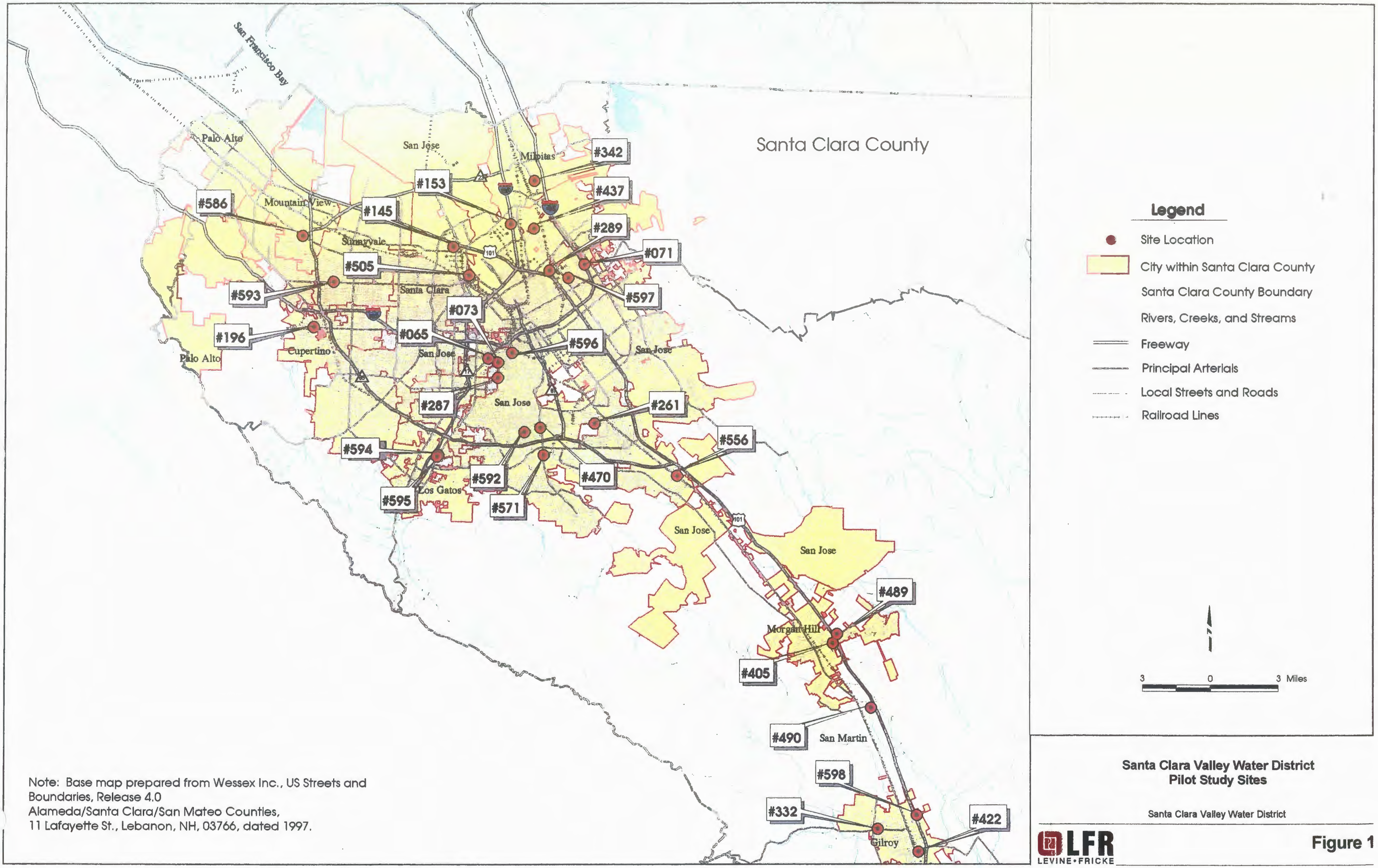
TPH = total petroleum hydrocarbons

ug/L = micrograms per liter

Data Qualifiers (if shown on table):

J = Estimated value

UJ =Not detected at the estimated reporting limit shown



Note: Base map prepared from Wessex Inc., US Streets and Boundaries, Release 4.0
Alameda/Santa Clara/San Mateo Counties,
11 Lafayette St., Lebanon, NH, 03766, dated 1997.

Santa Clara Valley Water District
Pilot Study Sites

Santa Clara Valley Water District

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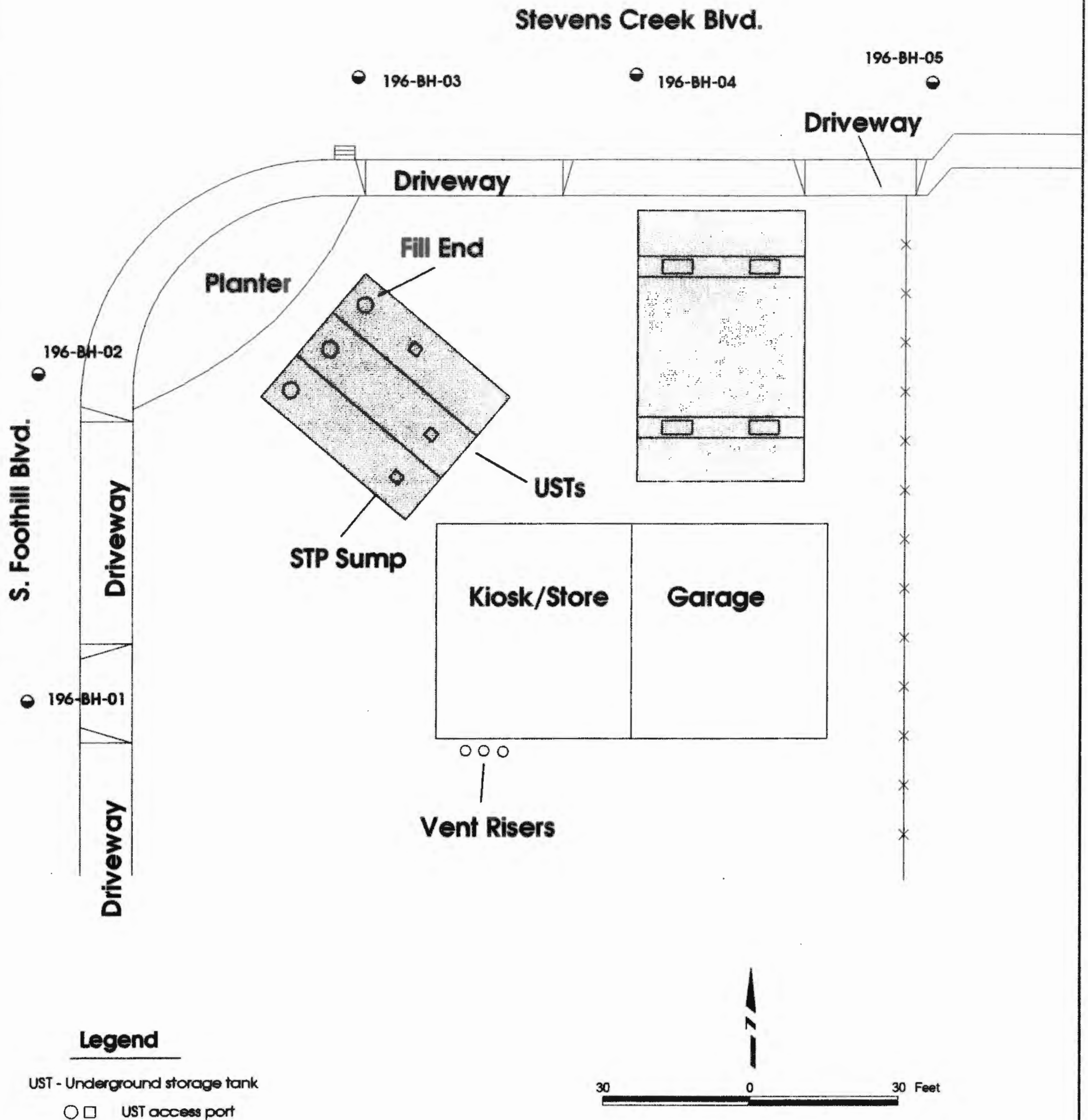
Figure 1



Legend

UST - Underground storage tank

○ □ UST access port

STP - Submersible turbine pump

▭ Concrete slab

▤ Storm Drain Catch Basin

◒ Soil and groundwater sampling location

Note: Base map prepared from LFR field plan.

u:/scvwd/gis/196.apr

Site #196

Site Plan

Santa Clara Valley Water District

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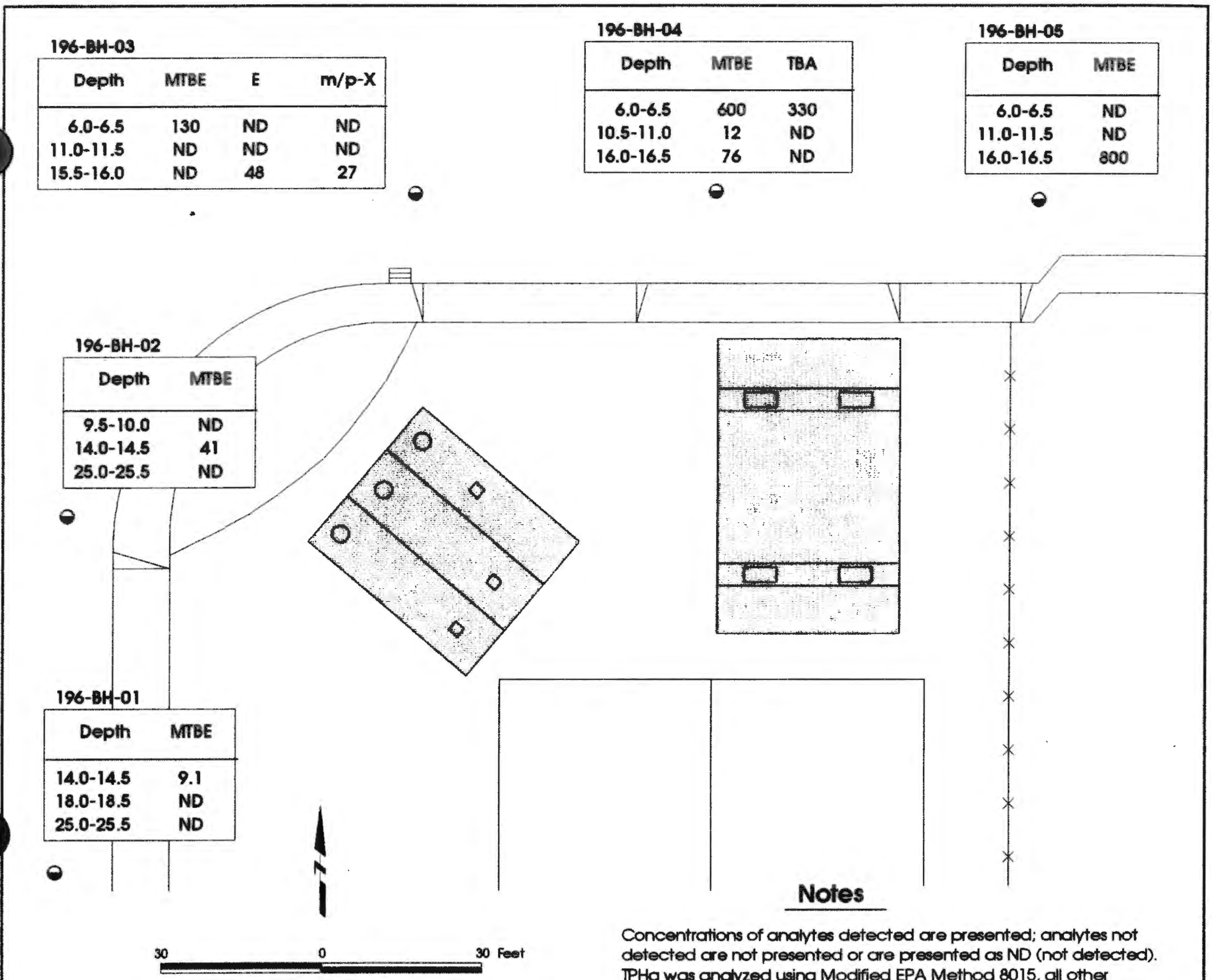
Figure 2



196-BH-03

Depth	MTBE	E	m/p-X
6.0-6.5	130	ND	ND
11.0-11.5	ND	ND	ND
15.5-16.0	ND	48	27

196-BH-04

Depth	MTBE	TBA
6.0-6.5	600	330
10.5-11.0	12	ND
16.0-16.5	76	ND

196-BH-05

Depth	MTBE
6.0-6.5	ND
11.0-11.5	ND
16.0-16.5	800

196-BH-02

Depth	MTBE
9.5-10.0	ND
14.0-14.5	41
25.0-25.5	ND

196-BH-01

Depth	MTBE
14.0-14.5	9.1
18.0-18.5	ND
25.0-25.5	ND

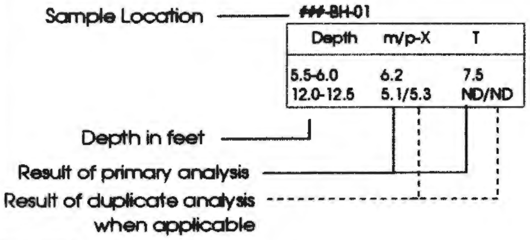
Legend

◒ Soil and groundwater sampling location

UST - Underground storage tank

○□ UST access port

The following represents a hypothetical sampling point and defines the characters associated with that point:



▭ Concrete slab

▤ Storm Drain Catch Basin

See Figure 2 for description of site features and origin of base map.

Notes

Concentrations of analytes detected are presented; analytes not detected are not presented or are presented as ND (not detected). TPHg was analyzed using Modified EPA Method 8015, all other analytes were analyzed using EPA Method 8260.

Results in micrograms/kilogram (ug/Kg) for all compounds except TPHg which is presented in milligrams/kilogram (mg/Kg).

RL = Reporting Limit

Each sample was analyzed for the following:

MTBE = Methyl Tertiary Butyl Ether (RL = 5 ug/Kg)
TPHg = Total Petroleum Hydrocarbons as Gasoline (RL = 1 mg/Kg)
B = Benzene (RL = 5 ug/Kg)
T = Toluene (RL = 5 ug/Kg)
E = Ethyl Benzene (RL = 5 ug/Kg)
m/p-X = meta/para-Xylenes (RL = 5 ug/Kg)
o-X = ortho-Xylene (RL = 5 ug/Kg)
DIPE = Di-isopropyl Ether (RL = 20 ug/Kg)
ETBE = Ethyl Tertiary Butyl Ether (RL = 20 ug/Kg)
TAME = Tertiary Amyl Methyl Ether (RL = 20 ug/Kg)
TBA = Tertiary Butyl Alcohol (RL = 200 ug/Kg)

Site #196

Summary of Chemical Analysis Results for Soil Samples

Santa Clara Valley Water District

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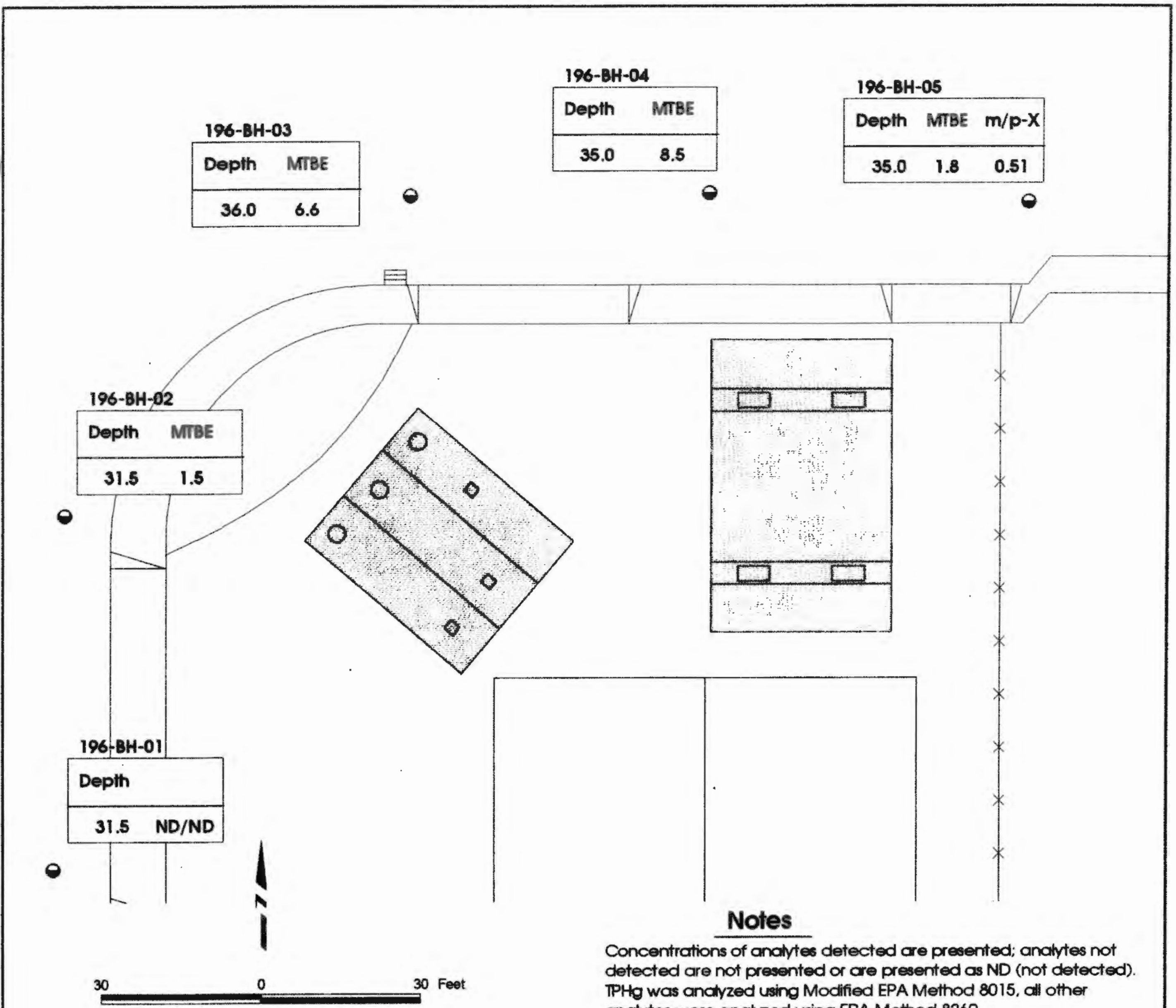
Figure 3



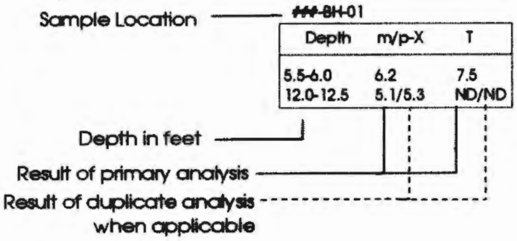
Legend

- ◒ Soil and groundwater sampling location

UST - Underground storage tank

○ □ UST access port

The following represents a hypothetical sampling point and defines the characters associated with that point:



▭ Concrete slab

▤ Storm Drain Catch Basin

See Figure 2 for description of site features and origin of base map.

Notes

Concentrations of analytes detected are presented; analytes not detected are not presented or are presented as ND (not detected). TPHg was analyzed using Modified EPA Method 8015, all other analytes were analyzed using EPA Method 8260.

Results in micrograms/liter (ug/L) for all compounds except TPHg which is presented in milligrams/liter (mg/L).

RL = Reporting Limit

Each sample was analyzed for the following:

MTBE = Methyl Tertiary Butyl Ether (RL = 0.5 ug/L)
TPHg = Total Petroleum Hydrocarbons as Gasoline (RL = 0.05 mg/L)
B = Benzene (RL = 0.5 ug/L)
T = Toluene (RL = 0.5 ug/L)
E = Ethyl Benzene (RL = 0.5 ug/L)
m/p-X = meta/para-Xylenes (RL = 0.5 ug/L)
o-X = ortho-Xylene (RL = 0.5 ug/L)
DIPE = Di-isopropyl Ether (RL = 1 ug/L)
ETBE = Ethyl Tertiary Butyl Ether (RL = 1 ug/L)
TAME = Tertiary Amyl Methyl Ether (RL = 1 ug/L)
TBA = Tertiary Butyl Alcohol (RL = 10 ug/L)

Site #196

Summary of Chemical Analysis Results for Groundwater Samples

Santa Clara Valley Water District

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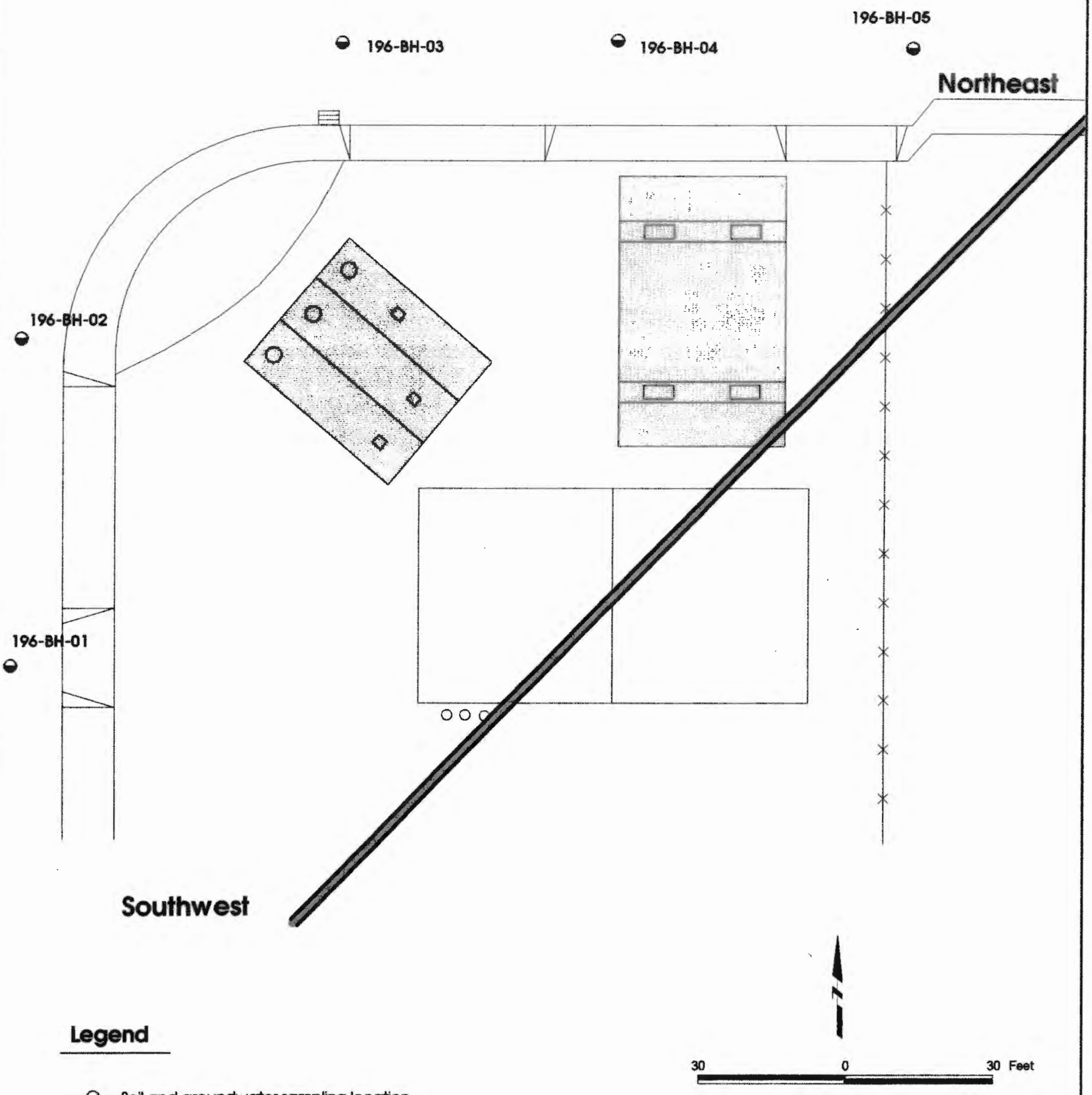
Figure 4



Legend

◒ Soil and groundwater sampling location

UST - Underground storage tank

○ □ UST access port

▭ Concrete slab

▤ Storm Drain Catch Basin

See Figure 2 for description of site features and origin of base map.

Site #196

Site Plan Showing Orientation of Vertical Profile

Santa Clara Valley Water District

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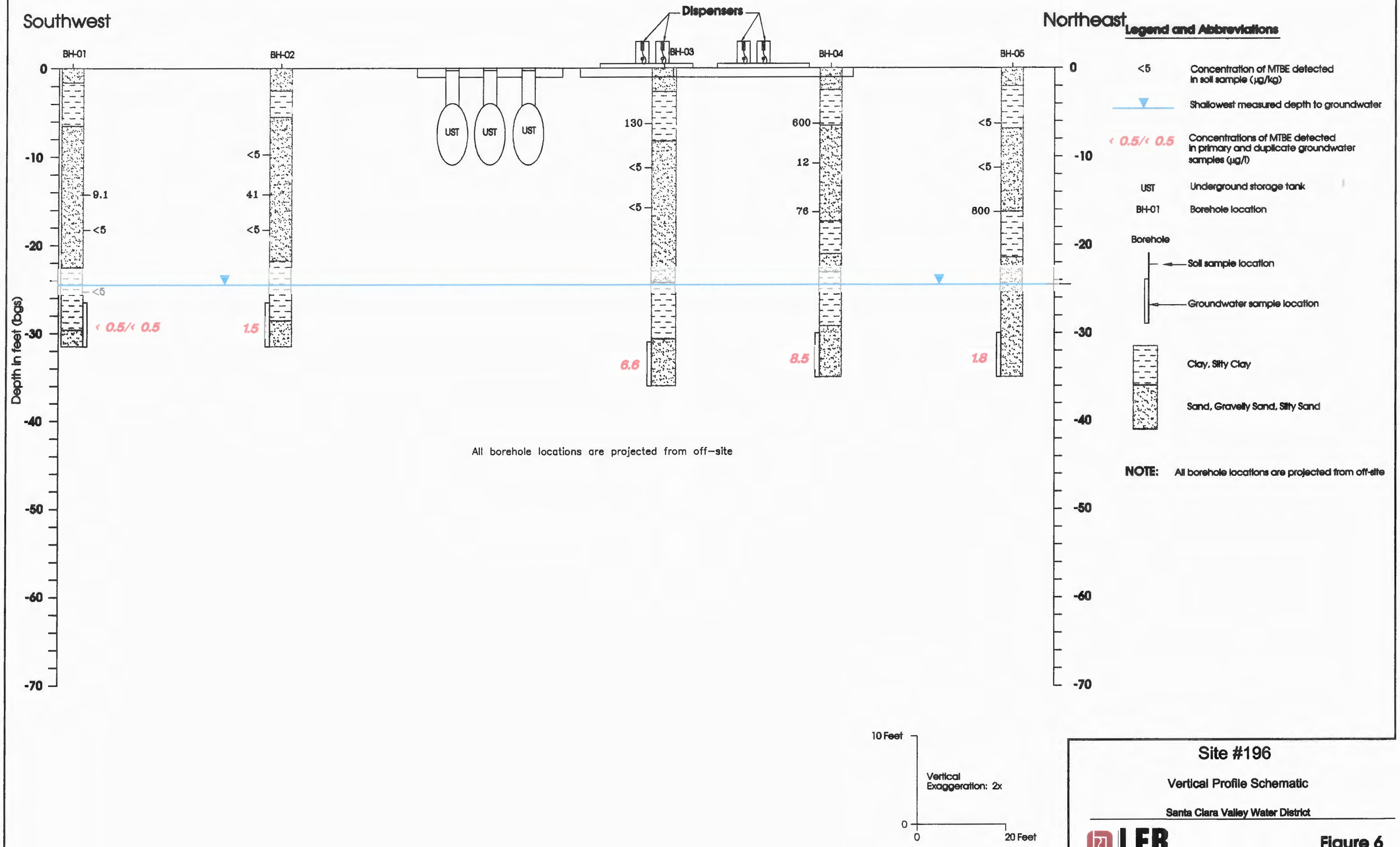
Figure 5

u:/scvwd/gis/196.apr


Southwest
Northeast
Dispensers
BH-01
BH-02
BH-03
BH-04
BH-05
UST
UST
UST
0
-10
-20
-30
-40
-50
-60
-70
Depth in feet (bgs)
9.1
<5
<5
‹ 0.5/‹ 0.5
<5
41
<5
1.5
130
<5
<5
6.6
600
12
76
8.5
<5
<5
800
1.8
All borehole locations are projected from off-site
Legend and Abbreviations
<5
Concentration of MTBE detected in soil sample (µg/kg)
Shallowest measured depth to groundwater
‹ 0.5/‹ 0.5
Concentrations of MTBE detected in primary and duplicate groundwater samples (µg/l)
UST
Underground storage tank
BH-01
Borehole location
Borehole
Soil sample location
Groundwater sample location
Clay, Silty Clay
Sand, Gravelly Sand, Silty Sand
NOTE: All borehole locations are projected from off-site
10 Feet
0
0
20 Feet
Vertical Exaggeration: 2x

J:\ENGCAD\6730\CM#196.DWG 04/30/99 x-sec.PCP

Site #196

Vertical Profile Schematic

Santa Clara Valley Water District

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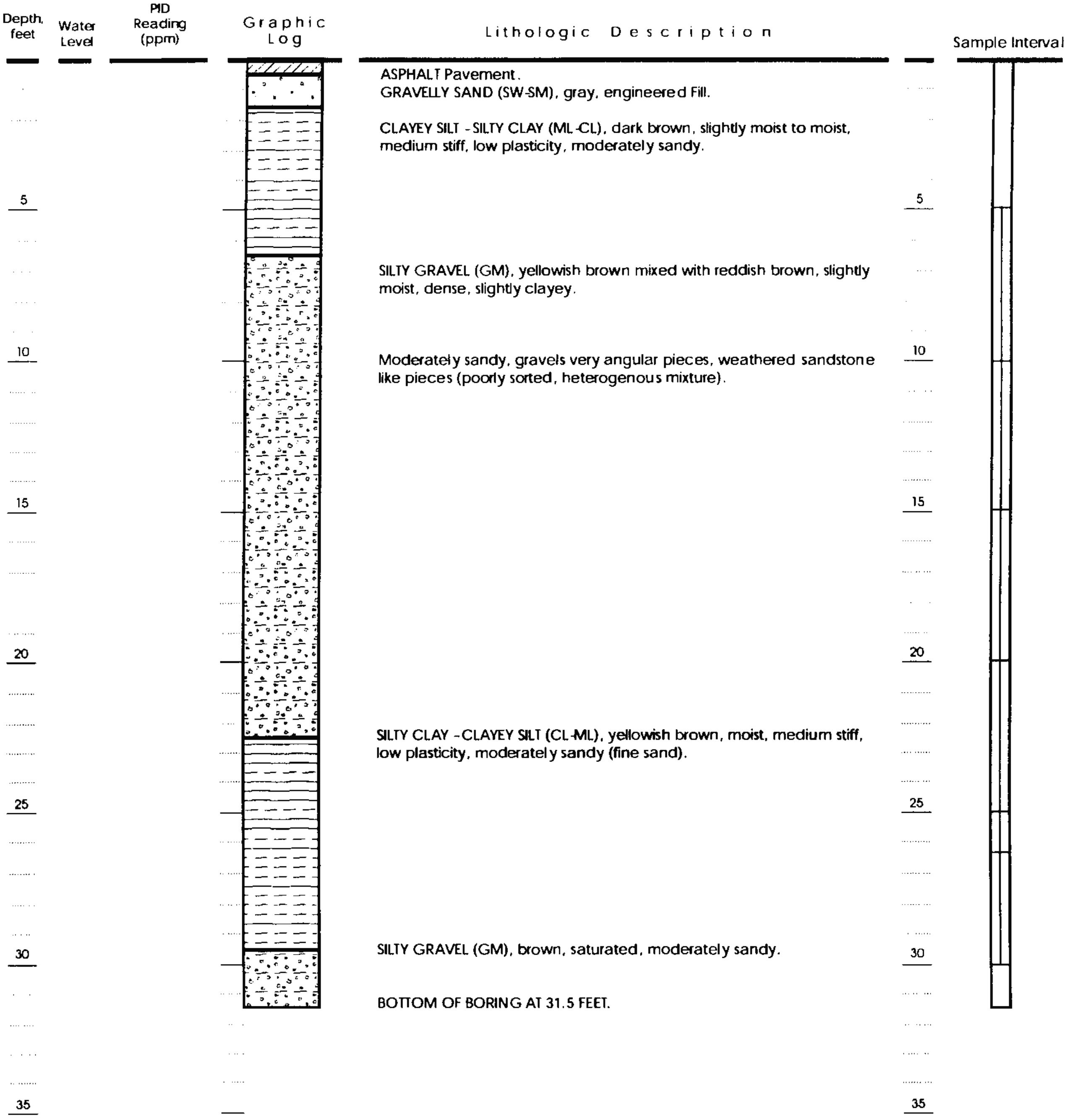
Figure 6

SCVWD PILOT STUDY



ASPHALT Pavement.

GRAVELLY SAND (SW-SM), gray, engineered Fill.

CLAYEY SILT - SILTY CLAY (ML-CL), dark brown, slightly moist to moist, medium stiff, low plasticity, moderately sandy.

SILTY GRAVEL (GM), yellowish brown mixed with reddish brown, slightly moist, dense, slightly clayey.

Moderately sandy, gravels very angular pieces, weathered sandstone like pieces (poorly sorted, heterogenous mixture).

SILTY CLAY - CLAYEY SILT (CL-ML), yellowish brown, moist, medium stiff, low plasticity, moderately sandy (fine sand).

SILTY GRAVEL (GM), brown, saturated, moderately sandy.

BOTTOM OF BORING AT 31.5 FEET.

Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled:
LFR Geologist: Thomas Zakaria, R.G., CH.G.

EXPLANATION

☰	Clay
☷	Silt
░	Sand
▨	Gravel

PID - Photoionization Detector

▼ Water level at time of drilling

REGISTERED GEOLOGIST
JENIFER J. BEATTY
No. 6650
Exp. 4/30/01
STATE OF CALIFORNIA

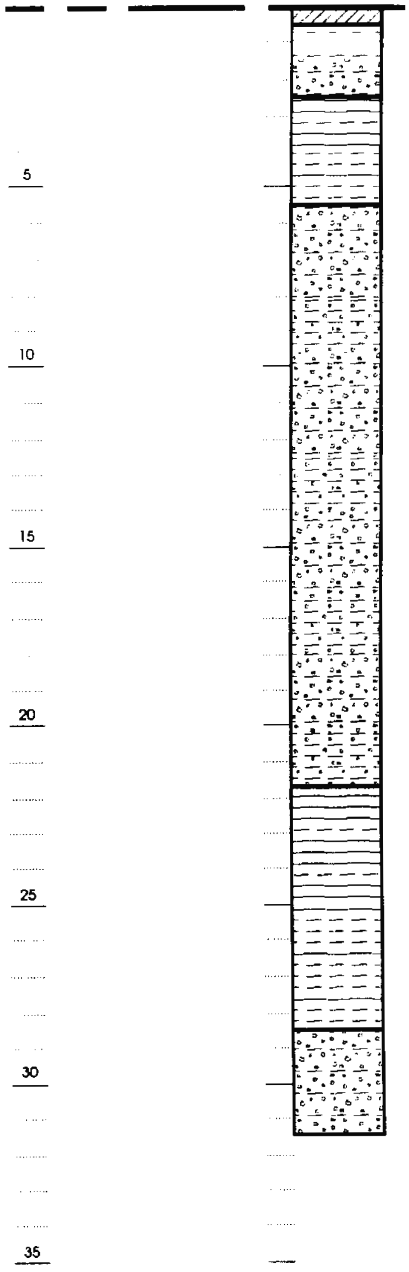
LFR
LEVINE·FRICKE

LITHOLOGY FOR 196-BH-01 *(page 1 of 1)*

Project No. 6730.00-024

SCVWD PILOT STUDY

Depth, feet	Water Level	PID Reading (ppm)	Graphic Log	Lithologic Description	Sample Interval



ASPHALT Pavement.
SILTY SAND - SILTY GRAVEL (SM-GM), greenish gray, engineered Fill.

SILTY CLAY - CLAYEY SILT (CL-ML), dark brown, slightly moist, stiff, low plasticity, moderately sandy.

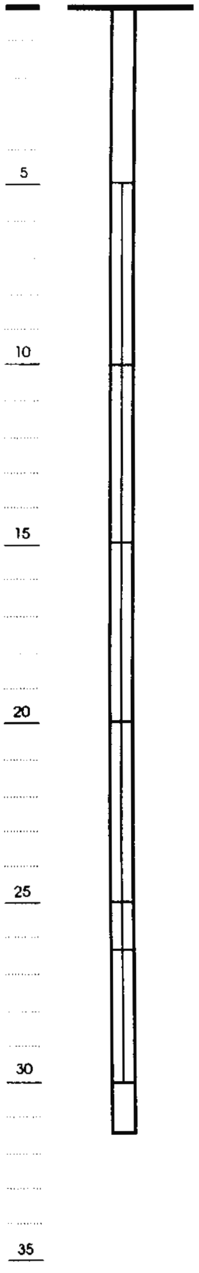
SILTY GRAVEL - GRAVELLY SILT (GM-ML), yellowish brown mixed with reddish brown, slightly moist, dense, slightly clayey, moderately sandy.

Sandy interval, yellowish brown, heterogenous mixture of weathered rock pieces (sandstone?) in silty matrix.

SILTY CLAY - CLAYEY SILT (CL-ML), yellowish brown, moist, medium stiff, low plasticity, moderately sandy (very fine sand).

SILTY GRAVEL (GM), brown, saturated, moderately sandy (fine), heterogenous mixture as above.

BOTTOM OF BORING AT 31.5 FEET.



EXPLANATION

▤	Clay
▤	Silt
▨	Sand
▨	Gravel

PID - Photoionization Detector

▼ Water level at time of drilling

Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled:
LFR Geologist: Thomas Zakaria, R.G., CH.G.

JENNIFER J. BEATTY
No. 6650
Exp. 4/30/01

LFR
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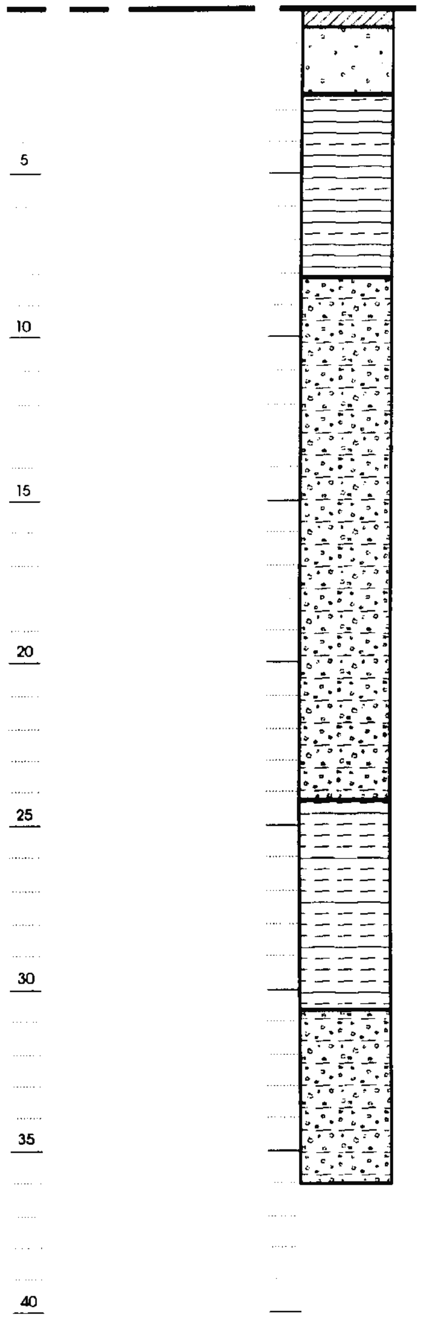
LITHOLOGY FOR 196-BH-02 *(page 1 of 1)*

Project No. 6730.00-024

SCVWD PILOT STUDY

Depth feet	Water Level	PID Reading (ppm)	Graphic Log	Lithologic Description	Sample Interval



ASPHALT pavement.
GRAVELLY SAND (SW-SM), gray, engineered Fill.

SILTY CLAY (CL), dark brown to dark reddish brown, moist, medium stiff, low plasticity, moderately sandy and gravelly.

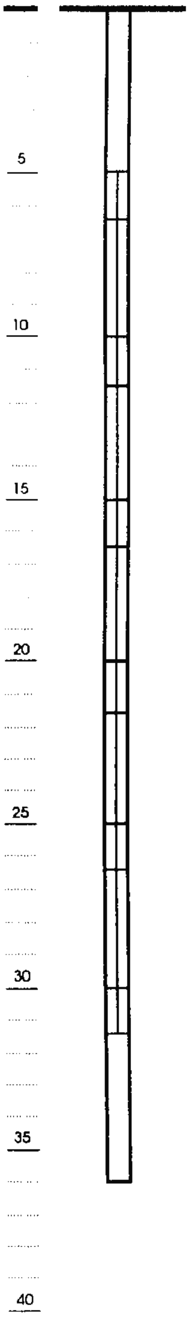
SILTY GRAVEL (GM), brown to yellowish brown mixed with reddish brown, slightly moist, medium dense to dense, heterogenous mixture of weathered sandstone-like pieces in silty matrix, poorly sorted.

Yellowish brown color.

CLAYEY SILT (ML), brown mixed with yellowish brown, slightly moist, stiff, low plasticity.

SILTY GRAVEL (GM), brown, moist, dense, weathered pieces of sandstone, angular dense gravel.

BOTTOM OF BORING AT 36 FEET.



EXPLANATION

▤	Clay
▤	Silt
▨	Sand
▨	Gravel

PID - Photoionization Detector

▼ Water level at time of drilling

Drilling Method:	Dual-Tube/Direct Push
Drilling Company:	Precision
Date Well Drilled:	
LFR Geologist:	Thomas Zakaria, R.G., CH.G.

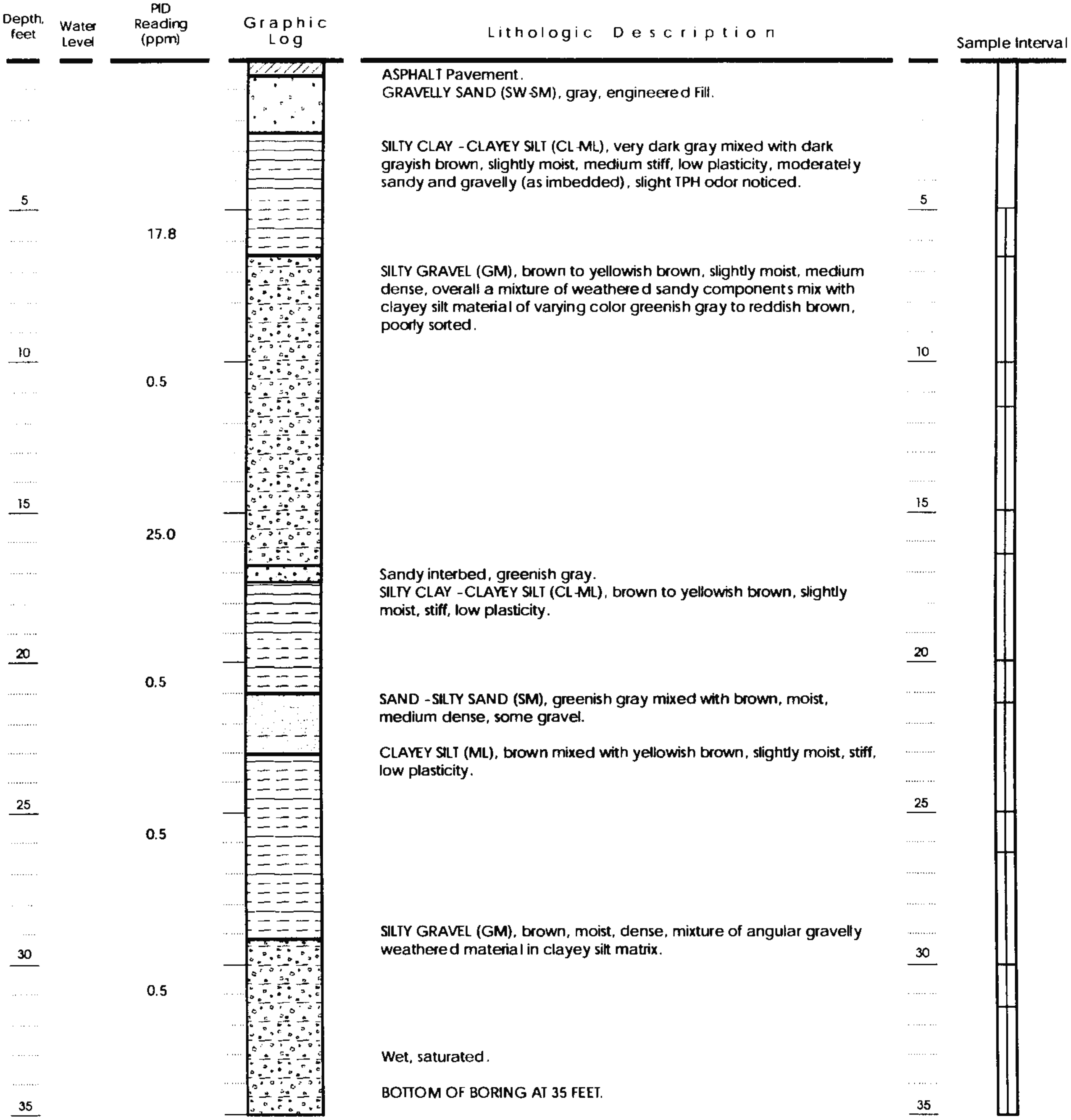
GEOLOGIST
J. BLATTY
No. 6650
Exp. 4/30/01

LFR
LEVINE·FRICKE

LITHOLOGY FOR 196-BH-03 *(page 1 of 1)*

Project No. 6730.00-030

SCVWD PILOT STUDY



ASPHALT Pavement.

GRAVELLY SAND (SW-SM), gray, engineered Fill.

SILTY CLAY - CLAYEY SILT (CL-ML), very dark gray mixed with dark grayish brown, slightly moist, medium stiff, low plasticity, moderately sandy and gravelly (as imbedded), slight TPH odor noticed.

SILTY GRAVEL (GM), brown to yellowish brown, slightly moist, medium dense, overall a mixture of weathered sandy components mix with clayey silt material of varying color greenish gray to reddish brown, poorly sorted.

Sandy interbed, greenish gray.

SILTY CLAY - CLAYEY SILT (CL-ML), brown to yellowish brown, slightly moist, stiff, low plasticity.

SAND - SILTY SAND (SM), greenish gray mixed with brown, moist, medium dense, some gravel.

CLAYEY SILT (ML), brown mixed with yellowish brown, slightly moist, stiff, low plasticity.

SILTY GRAVEL (GM), brown, moist, dense, mixture of angular gravelly weathered material in clayey silt matrix.

Wet, saturated.

BOTTOM OF BORING AT 35 FEET.

Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled:
LFR Geologist: Thomas Zakaria, R.G., CH.G.

EXPLANATION

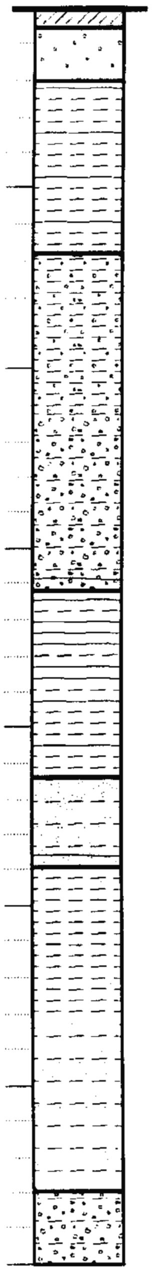
☰ Clay
☰ Silt
▨ Sand
▨ Gravel

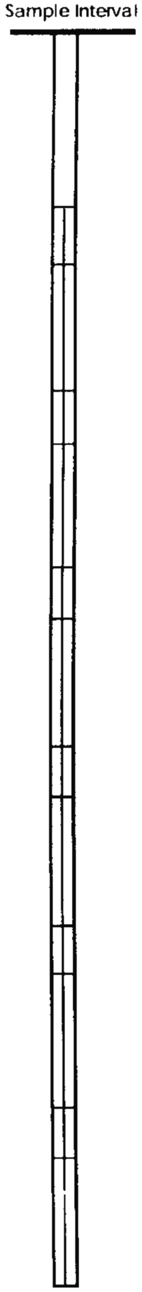
PID - Photoionization Detector

▼ Water level at time of drilling

JENNIFER J. BEATTY
No. 6650
Exp. 4/30/01

SCVWD PILOT STUDY





Depth, feet	Water Level	PID Reading (ppm)	Lithologic Description	Sample Interval
			ASPHALT Pavement. SANDY GRAVEL (GM), gray, engineered Fill.	
		0.0	CLAYEY SILT (ML), dark brown, slightly moist, stiff, low plasticity, very gravelly and sandy.	
5			SILTY CLAY - CLAYEY SILT (CL), very dark gray, moist, medium plasticity, less sandy and gravelly.	5
		0.0		
			GRAVELLY SILT - SILTY GRAVEL (GM-ML), yellowish brown mixed with reddish brown, dry to slightly moist. Overall: a heterogenous mixture of weathered rock material, mostly sandstone type in clayey matrix.	
10				10
		0.0	Some brown clay.	
15				15
		2.5	More clayey. SILTY CLAY - CLAYEY SILT, yellowish brown, slightly moist, stiff, medium plasticity, slightly sandy.	
20				20
		0.0	SILTY SAND (SM), brown, slightly moist to moist, dense, moderate clayey and gravelly.	
			More clayey.	
25			Moist to wet. SANDY SILT - SILTY SAND, brown, moist, dense, slightly clayey, fine to medium coarse sand in silt matrix.	25
30				30
			SILTY GRAVEL (GM), brown, saturated, heterogenous mixture of gravel pieces in silty material.	
35			BOTTOM OF BORING AT 35 FEET.	35

Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: March 10, 1999
LFR Geologist: Thomas Zakaria, R.G., CH.G.

EXPLANATION

☰	Clay
┅	Silt
▒	Sand
⁘	Gravel

PID - Photoionization Detector

▼ Water level at time of drilling

REGISTERED GEOLOGIST
JENNIFER J. BEATTY
No. 6650
Exp. 4/30/01

SANTA CLARA VALLEY WATER DISTRICT

Pilot Study of Operating Underground Storage Tanks

Santa Clara County, California

Site Report

SITE NUMBER 261

Unocal #7390
151 Branham Lane
San Jose, California 95136

April 27, 1999

This Site Report is one of a series of reports prepared for the Santa Clara Valley Water District's Pilot Study of Operating Underground Storage Tanks. The District funded this study to assess if MtBE is being released from UST systems that meet 1998 federal- and state-mandated upgrade requirements. The District will use the results of the Pilot Study, and possibly information obtained during subsequent investigations, to evaluate whether up-graded UST systems that handle MtBE are protective of groundwater quality, and ultimately drinking water. This Study and other District groundwater vulnerability assessments are critical in formulating a plan to protect drinking water supplies into the future.

With cooperation from the site owner and operator and the assistance of the San Jose Fire Department, LFR Levine·Fricke completed a file review, site inspection, and soil-gas, soil, and groundwater sampling at this site on behalf of the District. LFR's subcontractor, Integrated Engineering Services, completed a UST inspection at this site. This report provides a brief summary of investigation findings, and site-specific data in tables, figures, and appendices. This Site Report is appended to the Summary Report for the Study.

LFR
LEVINE·FRICKE
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(510) 652-4500/Fax (510) 652-2246

SUMMARY OF FINDINGS

SITE DESCRIPTION

Figure 1 illustrates the site location. Site geology consists primarily of silts and clays to depths of approximately 55 feet below the ground surface (bgs); coarse grained sediments were encountered between approximately 55 and 70 feet bgs, the total depth sampled. The shallowest measured depth to water was approximately 10 feet bgs.

SYSTEM DESCRIPTION

The UST system at the site consists of one 15,000-gallon and one 12,000-gallon gasoline UST constructed of double-walled steel with fiberglass wrap, and double-walled fiberglass piping. The UST system includes liquid probe monitoring for the UST and piping interstitial space.

RESULTS

MtBE was detected in soil-gas, soil, and groundwater samples at this site. MtBE was detected in 13 of the 26 soil gas samples collected, at concentrations ranging from 0.17 μg/l to 300,000 μg/l. MtBE was detected in 17 of the 18 soil samples collected, at concentrations ranging from 15 to 15,000 μg/l. MtBE was detected in all 8 groundwater samples collected, at concentrations ranging from 3 to 200,000 μg/l. Petroleum hydrocarbons (benzene, toluene, ethylbenzene, xylenes and gasoline range total petroleum hydrocarbons) were detected in 23 of the 26 soil gas samples, 7 of the 18 soil samples, and 3 of the 8 groundwater samples collected. The highest concentration of petroleum hydrocarbons in groundwater was 1.3 μg/l (benzene).

SITE SELECTION CRITERIA MET

1998 upgrade compliant?	Yes
On SCVWD fuel leak database?	No
Status:	Not applicable
Distance from LUST site:	Greater than 250 feet
Distance to water supply well:	Greater than 2000 feet
Access granted?	Yes
SCVWD approved?	Yes

FILE REVIEW SUMMARY

Number of tanks:	2
Reported release?	Yes, but no documented impact
Release date:	Not applicable
Fuel released:	Not applicable
Location:	Not applicable
Quantity (gallons):	Not applicable
Data available:	Not applicable

Comments:

Fire department file review on 10/14/98: 2/96 release report indicated a leaking pipe detected during tank testing. No other records available. Information provided by Tosco on 10/13/98 indicated no environmental records.

TOSCO file review on 12/17/98, post investigation: Environmental report for 12/92 indicates dealer records showed 500 gallon shortage in 11/92 and 12/92; dispenser was found to be badly leaking and monitoring probe not functioning. Memo indicates approximately 800 gallons removed from collection sump. Contractor noted no evidence of contamination into ground. Pipe leak detected during tank testing in 2/96. Pipes and dispensers replaced in 8/96 (former piping in fiberglass trench liners). Piping and trench liners noted to be in good condition. No soil sampling required by inspector. Soil sample collected from stockpiled soil generated during dispenser/line replacement did not contain detectable petroleum hydrocarbons. On 7/98, gasoline odors detected in the Kiosk. Consultant found loose riser fittings on the tanks. Vapors apparently emitted from risers and may have migrated through electrical conduits to Kiosk. Riser fittings tightened.

SITE VISIT - UST SYSTEM INFORMATION

Precision tank tightness records available?	No
Date of last test:	Not applicable
Method of tank testing:	Not applicable
Tank leak rate (gallons/hour):	Not applicable
UST overfill prevention system present?	Yes
Type of system:	Both overfill limiter and drop tube/check-valve
Automatic shut-off?	Yes
System operational?	Yes
Overfill containment (gallons):	15
Drop tube equipped with striker plate?	Yes
Under island containment present?	Yes
Under island containment monitoring:	Float
Quick release dispenser hoses?	Yes
Alarm system functional?	Yes - functional test performed of liquid probe in sump.
Type:	Shut-off
Vents:	
Vent type:	Dedicated
Vent piping:	Single walled
Condition of UST turbine sump:	Fair
Condition of UST flex line sump:	Fair
Vapor recovery system:	Vapor assisted
Years of operation since upgrade:	At least 10 years
Years of operation as fueling facility:	Approximately 13 years
Estimated throughput:	100,000 to 300,000 gallons per month
Monitoring systems operational?	
Systems operations, comment:	Printout from monitoring system indicates periodic test and alarm warnings are disabled.
Tank annular space monitoring:	Liquid probe
Overfill containment monitoring system:	Liquid probe
Piping leak detection:	Combined (pressure line leak detection and liquid probe)
Is system monitored?	Yes

Station inventory records available?	Not available
Records up to date?	Not applicable
Records complete?	Not applicable
Supplier log reviewed?	Not available
Spill log reviewed?	No
Spill log comments:	Not applicable
Personnel training:	On-site personnel appeared to have very little knowledge of the system.

Comments:

All alarms are monitored off-site. Leaks/ drips were noted around pipes beneath several of the dispensers. The minor leakage was contained in the dispenser pans.

SITE INSPECTION

Condition of apron around pumps:	Good
Evidence of recent paving/regrading?	No
Location of recent paving/regrading:	Not applicable
Description of surface drainage?	Towards storm drains at northeast and southwest corners of the site in approaches
Direct route for surface spills to subsurface?	Possible
Description of route to subsurface:	Storm drains
Other potential petroleum sources?	Yes
Description of other petroleum sources:	Service bays in building
Nearby surface water?	No
Name of surface water:	Not applicable
Type of surface water:	Not applicable

Comments:

No drilling into concrete pads. No monitoring wells observed.

UST SYSTEM DATA FROM FORM B COLLECTED DURING FILE REVIEWS - TANK ID # 001

Date installed:	1988
Tank capacity (gallons):	15,000
Tank contents:	Regular unleaded
Tank construction:	
Type of system:	Double wall
Tank material (primary tank):	Steel-clad with fiberglass reinforced plastic

Lining compatible with 100% methanol:	Yes
Exterior corrosion protection:	Fiberglass reinforced plastic
Date spill containment installed:	1988
Date overfill protection equipment installed:	1988
Drop tube:	Yes
Striker plate:	Yes
Dispenser containment:	Yes
Piping information:	
System type:	Pressure, underground
Construction:	Double wall, underground
Material and corrosion protection:	Fiberglass pipe, underground
Leak detection:	Mechanical line leak detection Continuous interstitial monitoring Automatic pump shut down
Tank leak detection?	Continuous interstitial monitoring

UST SYSTEM DATA FROM FORM B COLLECTED DURING FILE REVIEWS - TANK ID # 002

Date installed:	1988
Tank capacity (gallons):	12,000
Tank contents:	Premium unleaded
Tank construction:	
Type of system:	Double wall
Tank material (primary tank):	Steel-clad with fiberglass reinforced plastic
Lining compatible with 100% methanol:	Yes
Exterior corrosion protection:	Fiberglass reinforced plastic
Date spill containment installed:	1988
Date overfill protection equipment installed:	1988
Drop tube:	Yes
Striker plate:	Yes
Dispenser containment:	Yes
Piping information:	
System type:	Pressure, underground
Construction:	Double wall, underground
Material and corrosion protection:	Fiberglass pipe, underground
Leak detection:	Mechanical line leak detection Continuous interstitial monitoring Automatic pump shut down
Tank leak detection?	Continuous interstitial monitoring

Table 1
Summary of Chemical Analysis Results for Soil-Gas Samples - Site #261
Santa Clara Valley Water District

Location	Date Sampled	Depth (ft bgs)	Methyl Tertiary Butyl Ether (MTBE) ug/L	TPH as Gasoline (TPHg) ug/L	Benzene (B) ug/L	Toluene (T) ug/L	Ethyl Benzene (E) ug/L	meta/para-Xylenes (m/p-X) ug/L	ortho-Xylene (o-X) ug/L	Notes
261-SG-01	11/10/98	5	25	2700	<1	9.1	<1	<1	<1	
261-SG-01-SPL		5	0.17	NA	0.013	0.027	0.0075 J	0.032	0.011 J	(a)
261-SG-01		13	130	790	<1	7.3	<1	<1	<1	
		19	280	900	<1	10	<1	1.6	<1	
261-SG-02	11/11/98	5	8.1	1300	<1	4.3	<1	<1	<1	
		13	5.6	610	<1	3	<1	<1	<1	
261-SG-03	11/11/98	5	62	3000	<1	28	<1	<1	<1	
		12.5	5.4	<100	<1	2.2	<1	<1	<1	
261-SG-04	11/11/98	5	6.6	13000	<1	12	3.4	<1	<1	
		13	5.9	1100	<1	9.1	<1	2.4	<1	
		18	<5	430	<1	2	<1	<1	<1	
261-SG-05	11/10/98	5	<5	<100	<1	<1	<1	<1	<1	
		12	<5	<100	<1	<1	<1	6.6	<1	
		19	<5	<100	<1	<1	<1	<1	<1	
261-SG-06	11/10/98	5	<5 UJ	<100 UJ	<1 UJ	<1 UJ	<1 UJ	7.6 J	<1 UJ	
261-SG-06-DUP		5	<5	<100	3.5	<1	<1	6.8	<1	
261-SG-06		13	<5	110	4.6	<1	<1	<1	<1	
261-SG-07	11/10/98	5	7.4	1100	<1	15	<1	<1	<1	
		13	26	380	<1	24	3.6	<1	<1	
		19	820	17000	<1	980	<1	<1	<1	
261-SG-08	11/11/98	5	<5	480	<1	<1	<1	<1	<1	
		13	<5 UJ	<100 UJ	<1 UJ	<1 UJ	<1 UJ	<1 UJ	<1 UJ	
261-SG-09	11/11/98	5	<5	2800	<1	<1	<1	<1	<1	
		13	<5	1500	<1	<1	<1	<1	<1	
261-SG-10	11/11/98	5	<5	750	<1	<1	<1	<1	<1	
		13	<5	140	<1	<1	<1	<1	<1	

Table proofed by CLC.

Notes:
(a) Other analytes detected: Ethanol (0.029 ug/L) and Tertiary butyl alcohol (TBA) (0.0074 ug/L)
All primary and field duplicate (-DUP) samples were analyzed on site by InterPhase, of Los Angeles, CA using EPA Method 8020 for MTBE and BTEX, and Modified EPA Method 8015 for TPHg.
Additional field duplicate samples (-SPL) were analyzed off site by Air Toxics, Ltd., Folsom, CA using EPA Method TO-14.
ft bgs = feet below ground surface
NA = Not analyzed
TPH = total petroleum hydrocarbons
ug/L = micrograms per liter

Data Qualifiers (if shown on table):
E = Exceeds the calibration range
I = Interference by the sample matrix
J = Estimated value
UJ = Not detected at the estimated reporting limit shown

Table 2
Summary of Chemical Analysis Results for Soil Samples - Site #261
Santa Clara Valley Water District

Location	Date Sampled	Depth (ft bgs)	Methyl Tertiary Butyl Ether (MTBE) ug/Kg	TPH as Gasoline (TPHg) mg/Kg	Benzene (B) ug/Kg	Toluene (T) ug/Kg	Ethyl Benzene (E) ug/Kg	meta/para-Xylenes (m/p-X) ug/Kg	ortho-Xylene (o-X) ug/Kg	Di-isopropyl Ether (DIPE) ug/Kg	Ethyl Tertiary Butyl Ether (ETBE) ug/Kg	Tertiary Amyl Methyl Ether (TAME) ug/Kg	Tertiary Butyl Alcohol (TBA) ug/Kg
261-BH-01	11/16/98	7.5	500	<1	<5	27	<5	7	<5	<20	<20	<20	<200
		15.0	15000	<10	<40	140	<40	<40	<40	<160	<160	<160	<1600
		19.0	9100	<5	<20	<20	<20	<20	<20	<80	<80	<80	960
261-BH-02	11/16/98	7.5	5200	<2	<8	<8	<8	<8	<8	<32	<32	<32	<320
		15.0	660	1.5	9.2	220	14	43	10	<20	<20	<20	<200
		19.0	1500	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
261-BH-03	11/16/98	7.5	6000	<5	<20	<20	<20	<20	<20	<80	<80	<80	<800
		15.0	5900	31	<20	<20	640	<20	<20	<80	<80	<80	1200
		19.0	1600	<1	<5	18	<5	<5	<5	<20	<20	<20	430
261-BH-04	11/16/98	5.5	41	1.7	13	330	20	66	15	<20	<20	<20	<200
		12.5	15	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		22.0	74	1.3	10	280	18	56	13	<20	<20	<20	<200
261-BH-05	11/17/98	7.5	55	<1	<5	<5	<5	19	5.5	<20	<20	<20	<200
		15.0	39	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		19.5	34	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
261-BH-06	11/17/98	7.5	68	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		15.0	220	<1	<5	<5	<5	6.6	<5	<20	<20	<20	<200
		19.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200

Table proofed by CLC.

Notes:

All samples were analyzed by Alpha Analytical, Inc. of Sparks, NV, using EPA Method 8260 for MTBE, BTEX, DIPE, ETBE, TAME, and TBA, and Modified EPA Method 8015 for TPHg.

ft bgs = feet below ground surface
mg/Kg = milligrams per kilogram
TPH = total petroleum hydrocarbons
ug/Kg = micrograms per kilogram

Data Qualifiers (if shown on table):

J = Estimated value
UJ =Not detected at the estimated reporting limit shown

Table 3
Summary of Chemical Analysis Results for Groundwater Samples - Site # 261
Santa Clara Valley Water District

Location	Date Sampled	Depth (ft bgs)	Methyl Tertiary Butyl Ether (MTBE) ug/L	TPH as Gasoline (TPHg) mg/L	Benzene (B) ug/L	Toluene (T) ug/L	Ethyl Benzene (E) ug/L	meta/para-Xylenes (m/p-X) ug/L	ortho-Xylene (o-X) ug/L	Di-isopropyl Ether (DIPE) ug/L	Ethyl Tertiary Butyl Ether (ETBE) ug/L	Tertiary Amyl Methyl Ether (TAME) ug/L	Tertiary Butyl Alcohol (TBA) ug/L
261-BH-01	11/16/98	22.0	200000	<130	0.60 J	<0.50 UJ	<0.50 UJ	<0.50 UJ	<0.50 UJ	<1.0 UJ	5.2 J	95 J	<10 UJ
261-BH-02	11/16/98	22.0	19000	<5	1.1 J	<0.50 UJ	<0.50 UJ	<0.50 UJ	<0.50 UJ	<1.0 UJ	2.7 J	5.0 J	1100
261-BH-03	11/16/98	22.0	16000	<13	1.3 J	0.70 J	10 J	<0.50 UJ	<0.50 UJ	<1.0 UJ	4.4 J	8.1 J	2300
261-BH-04	11/16/98	22.0	5400	<13	<50	<50	<50	<50	<50	<100	<100	<100	<1000
		56.0	3	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<10
261-BH-05	11/17/98	22.0	190	<0.25	<1	<1	<1	<1	<1	<2	<2	<2	<20
261-BH-05-DUP		22.0	200	<0.25	<1	<1	<1	<1	<1	<2	<2	<2	<20
261-BH-06	11/17/98	22.0	110	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<10

Table proofed by CLC.

Notes:

All primary and field duplicate (-DUP) samples were analyzed by Alpha Analytical, Inc. of Sparks, NV, using EPA Method 8260 for MTBE, BTEX, DIPE, ETBE, TAME, and TBA, and Modified EPA Method 8015 for TPHg.

ft bgs = feet below ground surface
mg/L = milligrams per liter
TPH = total petroleum hydrocarbons
ug/L = micrograms per liter

Data Qualifiers (if shown on table):

J = Estimated value
UJ =Not detected at the estimated reporting limit shown

Table 4
Summary of Physical Parameters for Soil Samples - Site #261

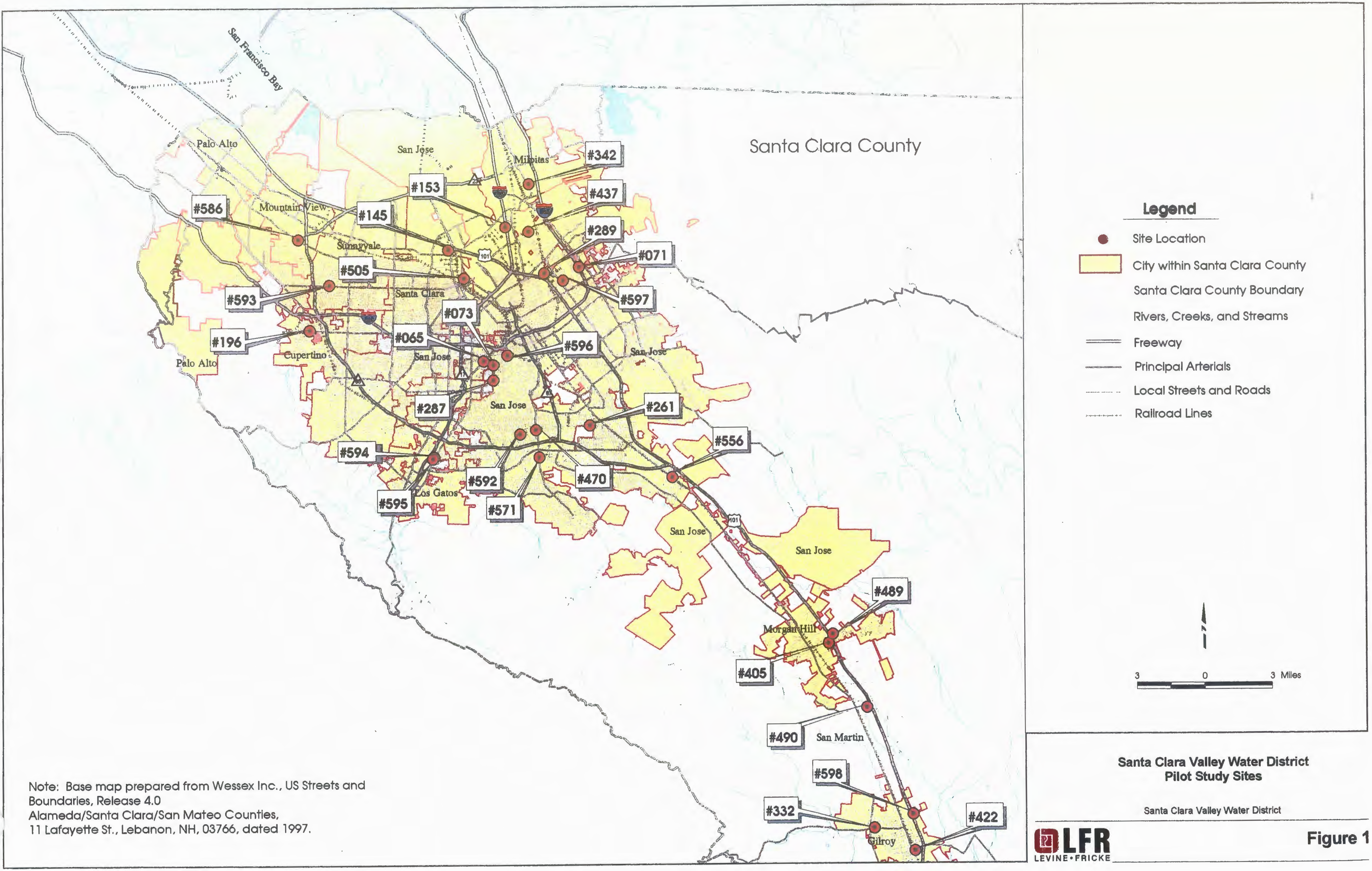
Santa Clara Valley Water District

Location	Depth (ft bgs)	Visual Description	Total Organic Carbon (percent)	Moisture Content (percent)	Wet Weight (lbs/cu.ft.)	Dry Unit Weight (lbs/cu.ft.)	Porosity (percent)
261-BH-05	6.0 - 6.5	Brown silty clay	0.18	18.31	130.3	110.1	34.64
	8.5 - 9.0	Brown silty clay	0.19	19.73	121.4	101.4	39.80
	19.0 - 19.5	Brown fine sandy silty clay	0.08	23.10	129.3	105.1	37.60

Table proofed by CLC.

Notes:

Specific gravity values were 2.70 for all samples analyzed.
Total organic carbon analyses were performed by Curtis and Tompkins Analytical Laboratories, Berkeley, CA.
All other analyses were performed by URS Greiner Woodward Clyde, Oakland, CA.
ft bgs = feet below ground surface
lbs/cu.ft. = pounds per cubic foot
NA = Not analyzed



Note: Base map prepared from Wessex Inc., US Streets and Boundaries, Release 4.0
Alameda/Santa Clara/San Mateo Counties,
11 Lafayette St., Lebanon, NH, 03766, dated 1997.

Santa Clara Valley Water District
Pilot Study Sites

Santa Clara Valley Water District

LFR
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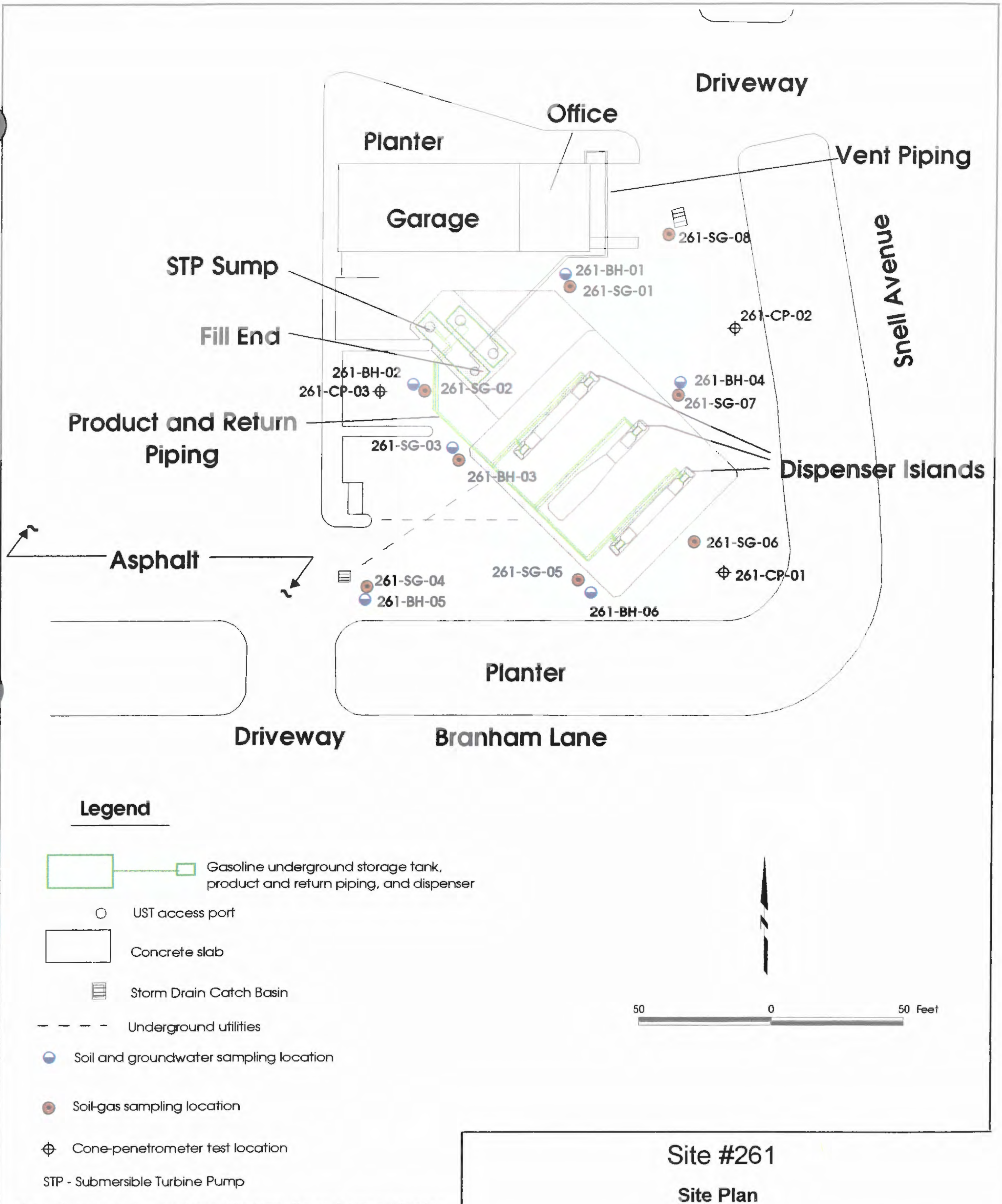
Figure 1



Note: Base map prepared from Site Map, Figure 1, Unocal Service Station 7390, 151 Branham Lane at Snell Avenue, San Jose, CA by Pacific Environmental Group, Inc., dated 8-9-96, General Arrangement Service Station #7390, Snell Ave. & Branham Lane, San Jose, CA, Robert H. Lee & Associates, Inc., (orginal and revision dates unclear) and an untitled site plan provided by the owner.

Site #261

Site Plan

Santa Clara Valley Water District

LFR
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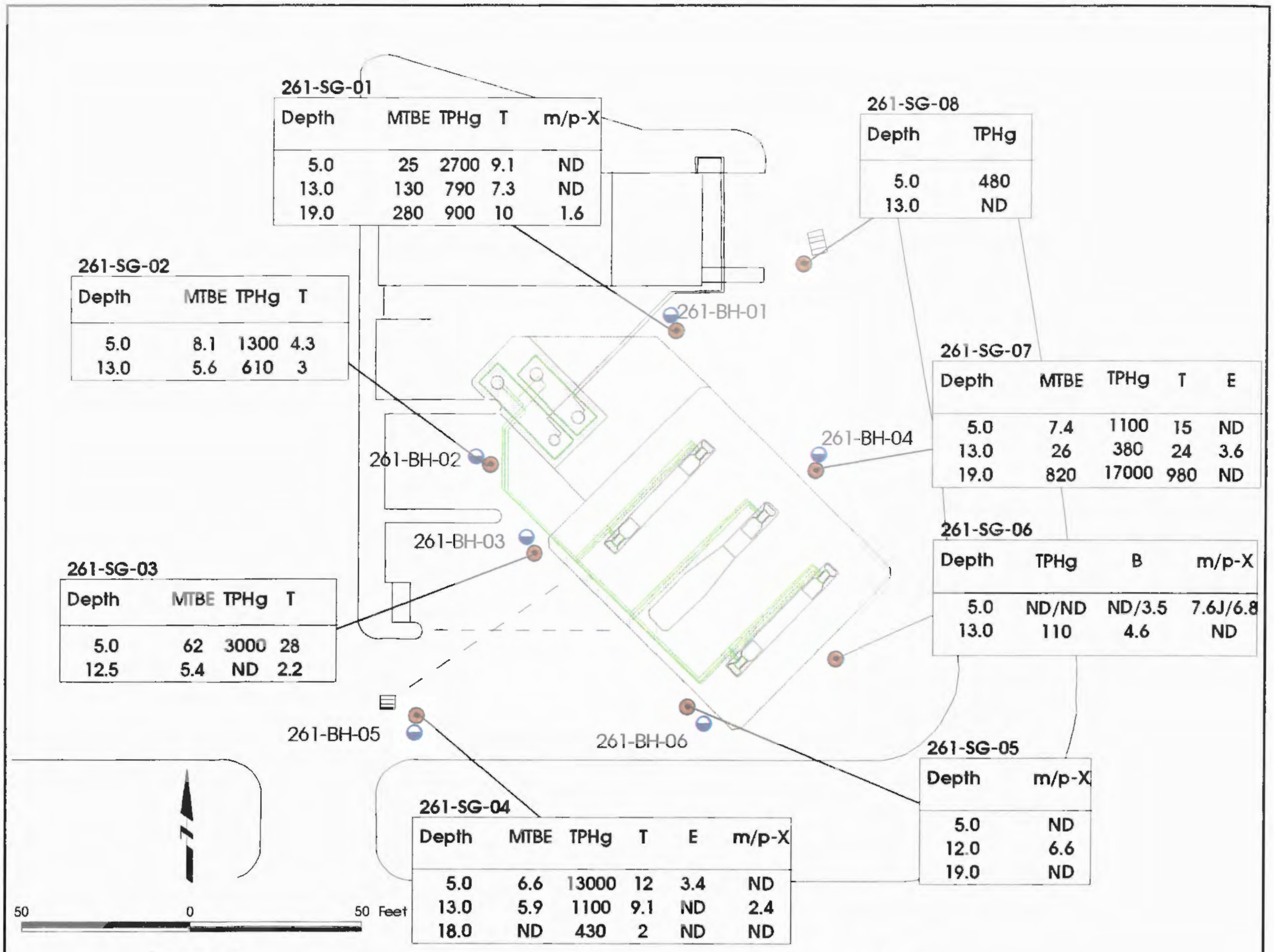
Figure 2



261-SG-01

Depth	MTBE	TPHg	T	m/p-X
5.0	25	2700	9.1	ND
13.0	130	790	7.3	ND
19.0	280	900	10	1.6

261-SG-02

Depth	MTBE	TPHg	T
5.0	8.1	1300	4.3
13.0	5.6	610	3

261-SG-03

Depth	MTBE	TPHg	T
5.0	62	3000	28
12.5	5.4	ND	2.2

261-SG-04

Depth	MTBE	TPHg	T	E	m/p-X
5.0	6.6	13000	12	3.4	ND
13.0	5.9	1100	9.1	ND	2.4
18.0	ND	430	2	ND	ND

261-SG-05

Depth	m/p-X
5.0	ND
12.0	6.6
19.0	ND

261-SG-06

Depth	TPHg	B	m/p-X
5.0	ND/ND	ND/3.5	7.6J/6.8
13.0	110	4.6	ND

261-SG-07

Depth	MTBE	TPHg	T	E
5.0	7.4	1100	15	ND
13.0	26	380	24	3.6
19.0	820	17000	980	ND

261-SG-08

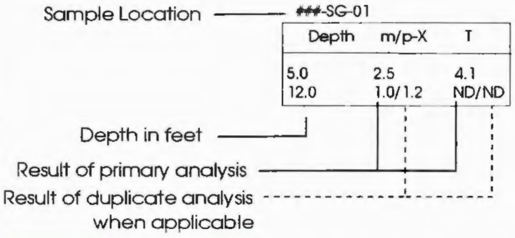
Depth	TPHg
5.0	480
13.0	ND

Legend

● Soil-gas sampling location

◒ Soil and groundwater sampling location

The following represents a hypothetical sampling point and defines the characters associated with that point:



🟩 Gasoline underground storage tank, product and return piping, and dispenser

○ UST access port

☐ Concrete slab

▤ Storm Drain Catch Basin

— — — — Underground utilities

See Figure 2 for description of site features and origin of base map.

Notes

Concentrations of analytes detected are presented; analytes not detected are not presented or are presented as ND (not detected). MTBE and BTEX were analyzed using EPA Method 8020 and TPHg was analyzed using Modified EPA Method 8015.

Results in micrograms/liter (ug/L)
RL = Reporting Limit

J = Estimated Value

Each sample was analyzed for the following:

MTBE = Methyl Tertiary Butyl Ether (RL = 5 ug/L)
TPHg = Total Petroleum Hydrocarbons as Gasoline (RL = 100 ug/L)
B = Benzene (RL = 1 ug/L)
T = Toluene (RL = 1 ug/L)
E = Ethyl Benzene (RL = 1 ug/L)
m/p-X = meta/para-Xylenes (RL = 1 ug/L)
o-X = ortho-Xylene (RL = 1 ug/L)

Site #261

Summary of Chemical Analysis Results for Soil-Gas Samples

Santa Clara Valley Water District

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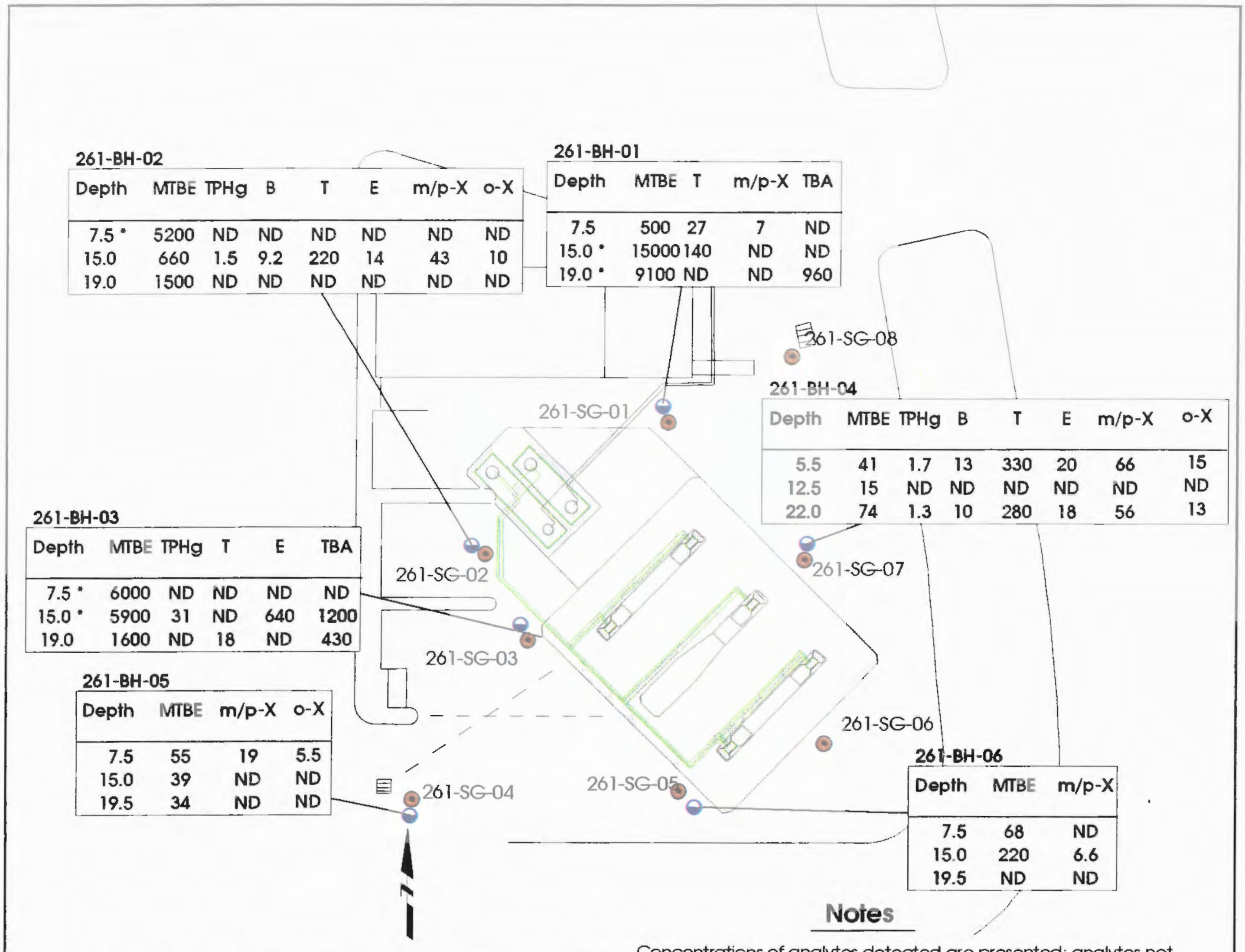
Figure 3



261-BH-02

Depth	MTBE	TPHg	B	T	E	m/p-X	o-X
7.5 *	5200	ND	ND	ND	ND	ND	ND
15.0	660	1.5	9.2	220	14	43	10
19.0	1500	ND	ND	ND	ND	ND	ND

261-BH-01

Depth	MTBE	T	m/p-X	TBA
7.5	500	27	7	ND
15.0 *	15000	140	ND	ND
19.0 *	9100	ND	ND	960

261-BH-04

Depth	MTBE	TPHg	B	T	E	m/p-X	o-X
5.5	41	1.7	13	330	20	66	15
12.5	15	ND	ND	ND	ND	ND	ND
22.0	74	1.3	10	280	18	56	13

261-BH-03

Depth	MTBE	TPHg	T	E	TBA
7.5 *	6000	ND	ND	ND	ND
15.0 *	5900	31	ND	640	1200
19.0	1600	ND	18	ND	430

261-BH-05

Depth	MTBE	m/p-X	o-X
7.5	55	19	5.5
15.0	39	ND	ND
19.5	34	ND	ND

261-BH-06

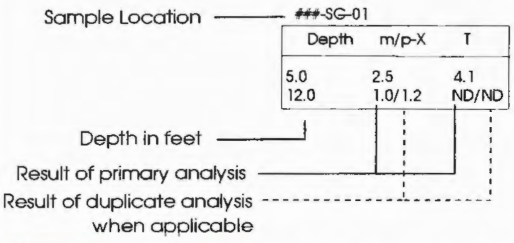
Depth	MTBE	m/p-X
7.5	68	ND
15.0	220	6.6
19.5	ND	ND

Legend

● Soil-gas sampling location

◒ Soil and groundwater sampling location

The following represents a hypothetical sampling point and defines the characters associated with that point:


Sample Location
Depth in feet
Result of primary analysis
Result of duplicate analysis when applicable

###-SG-01

Depth	m/p-X	T
5.0	2.5	4.1
12.0	1.0/1.2	ND/ND

▭ Gasoline underground storage tank, product and return piping, and dispenser

○ UST access port

▭ Concrete slab

▤ Storm Drain Catch Basin

— — — — Underground utilities

See Figure 2 for description of site features and origin of base map.

Notes

Concentrations of analytes detected are presented; analytes not detected are not presented or are presented as ND (not detected). TPHg was analyzed using Modified EPA Method 8015, all other analytes were analyzed using EPA Method 8260.

Results in micrograms/kilogram (ug/Kg) for all compounds except TPHg which is presented in milligrams/kilogram (mg/Kg).

RL = Reporting Limit
* Indicates elevated RL (see results table for reporting limits)

Each sample was analyzed for the following:

MTBE = Methyl Tertiary Butyl Ether (RL = 5 ug/Kg)
TPHg = Total Petroleum Hydrocarbons as Gasoline (RL = 1 mg/Kg)
B = Benzene (RL = 5 ug/Kg)
T = Toluene (RL = 5 ug/Kg)
E = Ethyl Benzene (RL = 5 ug/Kg)
m/p-X = meta/para-Xylenes (RL = 5 ug/Kg)
o-X = ortho-Xylene (RL = 5 ug/Kg)
DIPE = Di-isopropyl Ether (RL = 20 ug/Kg)
ETBE = Ethyl Tertiary Butyl Ether (RL = 20 ug/Kg)
TAME = Tertiary Amyl Methyl Ether (RL = 20 ug/Kg)
TBA = Tertiary Butyl Alcohol (RL = 200 ug/Kg)

Site #261

Summary of Chemical Analysis Results for Soil Samples

Santa Clara Valley Water District

LFR
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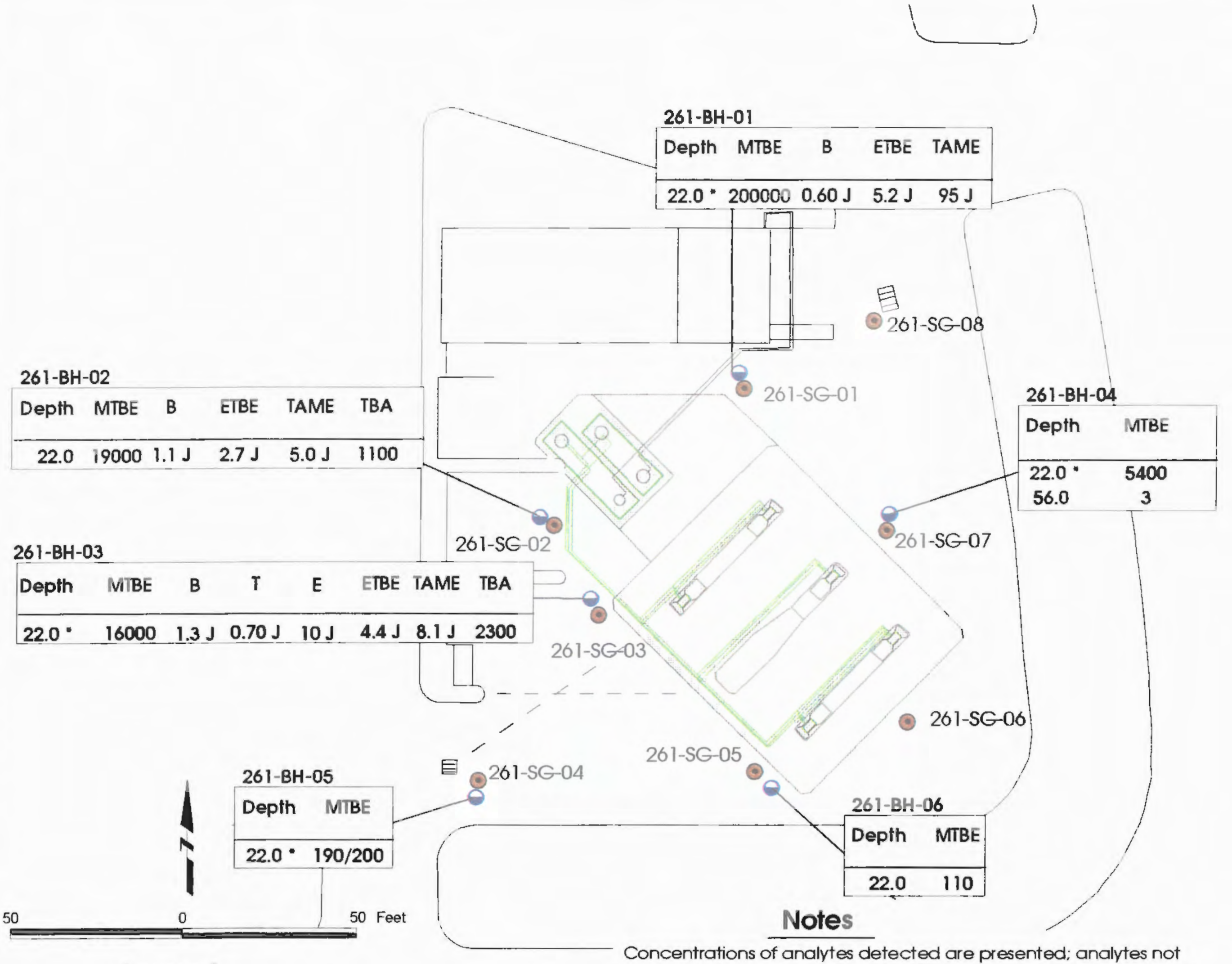
Figure 4

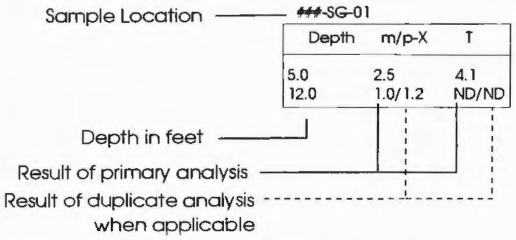


Legend

● Soil-gas sampling location

◒ Soil and groundwater sampling location

The following represents a hypothetical sampling point and defines the characters associated with that point:



🟩 Gasoline underground storage tank, product and return piping, and dispenser

○ UST access port

☐ Concrete slab

▤ Storm Drain Catch Basin

– – – – Underground utilities

See Figure 2 for description of site features and origin of base map.

Notes

Concentrations of analytes detected are presented; analytes not detected are not presented or are presented as ND (not detected). TPHg was analyzed using Modified EPA Method 8015, all other analytes were analyzed using EPA Method 8260.

Results in micrograms/liter (ug/L) for all compounds except TPHg which is presented in milligrams/liter (mg/L).

J = Estimated Value
RL = Reporting Limit
* Indicates elevated RL (see results table for reporting limits)

Each sample was analyzed for the following:

MTBE = Methyl Tertiary Butyl Ether (RL = 0.5 ug/L)
TPHg = Total Petroleum Hydrocarbons as Gasoline (RL = 0.05 mg/L)
B = Benzene (RL = 0.5 ug/L)
T = Toluene (RL = 0.5 ug/L)
E = Ethyl Benzene (RL = 0.5 ug/L)
m/p-X = meta/para-Xylenes (RL = 0.5 ug/L)
o-X = ortho-Xylene (RL = 0.5 ug/L)
DIPE = Di-isopropyl Ether (RL = 1 ug/L)
ETBE = Ethyl Tertiary Butyl Ether (RL = 1 ug/L)
TAME = Tertiary Amyl Methyl Ether (RL = 1 ug/L)
TBA = Tertiary Butyl Alcohol (RL = 10 ug/L)

Site #261

Summary of Chemical Analysis Results for Groundwater Samples

Santa Clara Valley Water District

LFR
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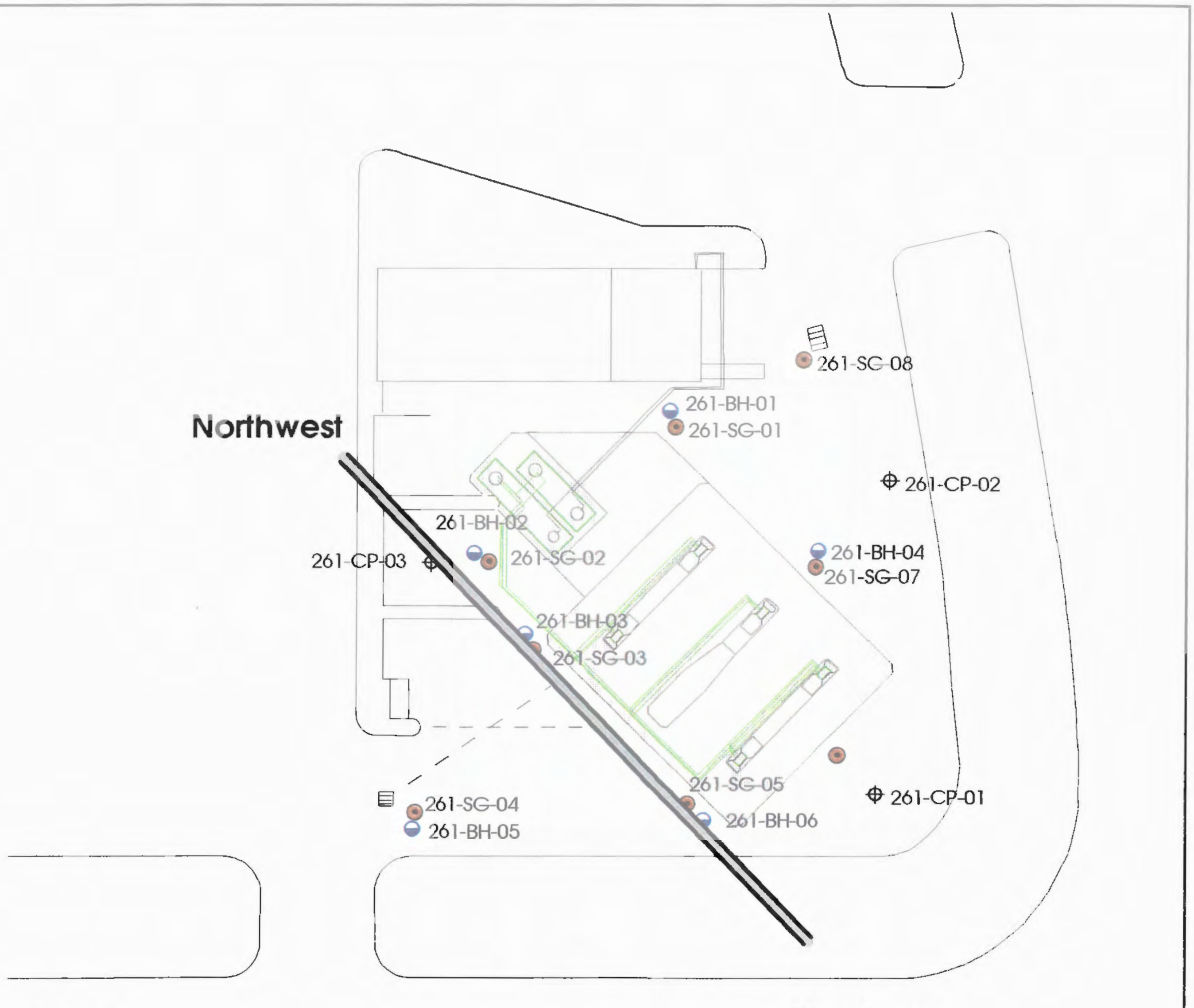
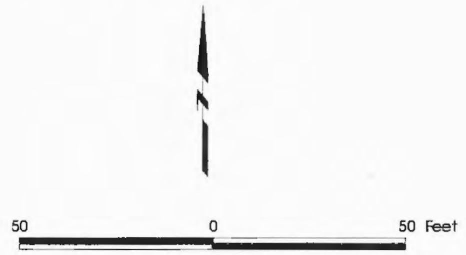
Figure 5



Legend

- ▬ Vertical Profile Location
- 🟩 Gasoline underground storage tank, product and return piping, and dispenser
- ○ UST access port
- ☐ Concrete slab
- ▤ Storm Drain Catch Basin
- – – – Underground utilities
- ◒ Soil and groundwater sampling location
- ● Soil-gas sampling location
- ⊕ Cone-penetrometer test location

See Figure 2 for description of site features and origin of base map.



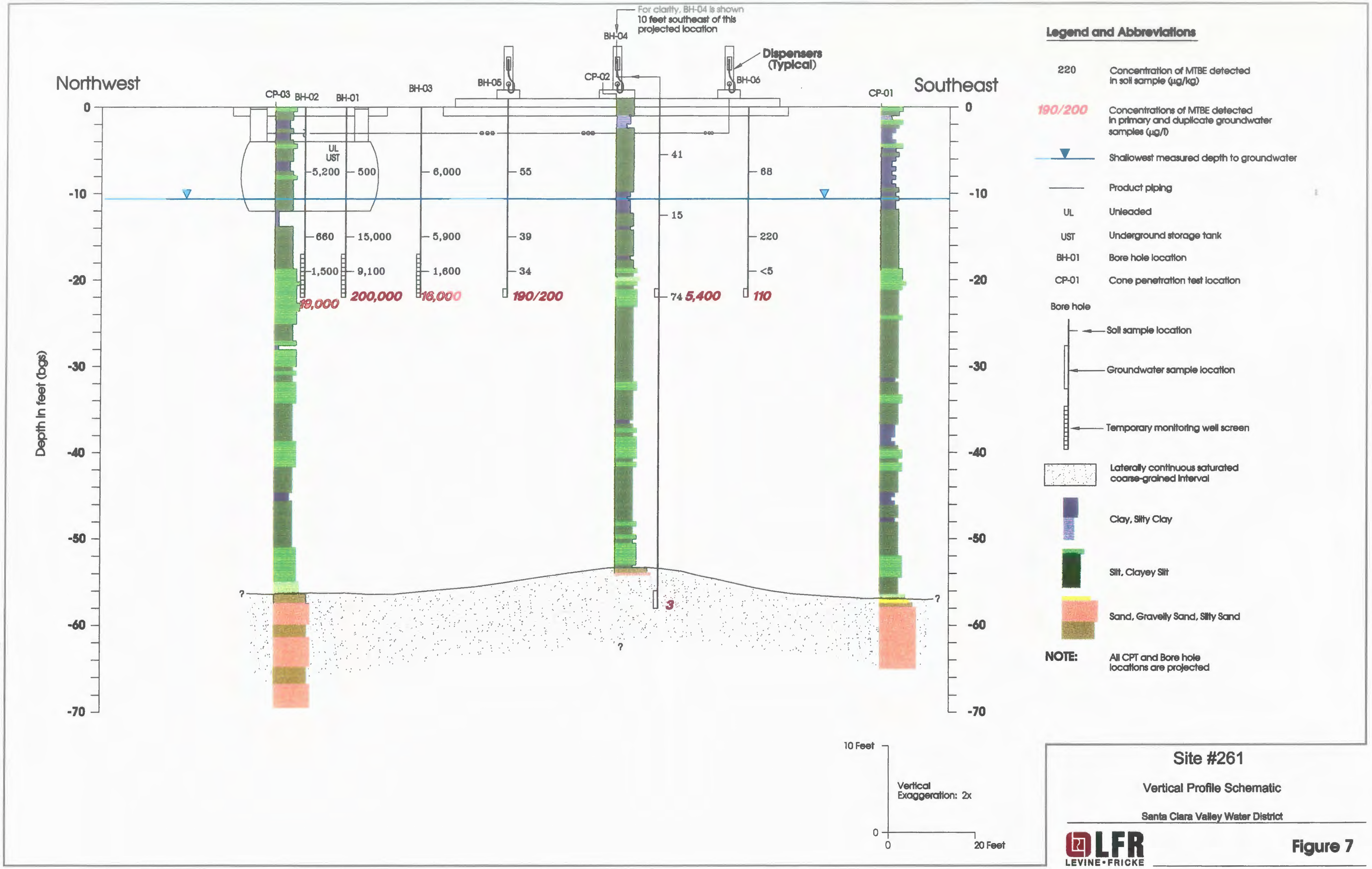
Site #261

Site Plan Showing Location of Vertical Profile

Santa Clara Valley Water District

LFR LEVINE•FRICKE

Figure 6


For clarity, BH-04 is shown 10 feet southeast of this projected location
BH-04
Dispensers (Typical)
Northwest
Southeast
CP-03
BH-02
BH-01
BH-03
BH-05
CP-02
BH-06
CP-01
UL UST
5,200
500
6,000
55
41
68
660
15,000
5,900
39
15
220
1,500
9,100
1,600
34
<5
19,000
200,000
16,000
190/200
74
5,400
110
3
?
Depth in feet (bgs)
0
-10
-20
-30
-40
-50
-60
-70
10 Feet
0
20 Feet
Vertical Exaggeration: 2x
Legend and Abbreviations
220 Concentration of MTBE detected in soil sample (µg/kg)
190/200 Concentrations of MTBE detected in primary and duplicate groundwater samples (µg/l)
Shallowest measured depth to groundwater
Product piping
UL Unleaded
UST Underground storage tank
BH-01 Bore hole location
CP-01 Cone penetration test location
Bore hole
Soil sample location
Groundwater sample location
Temporary monitoring well screen
Laterally continuous saturated coarse-grained interval
Clay, Silty Clay
Silt, Clayey Silt
Sand, Gravelly Sand, Silty Sand
NOTE: All CPT and Bore hole locations are projected

Site #261

Vertical Profile Schematic

Santa Clara Valley Water District

LFR
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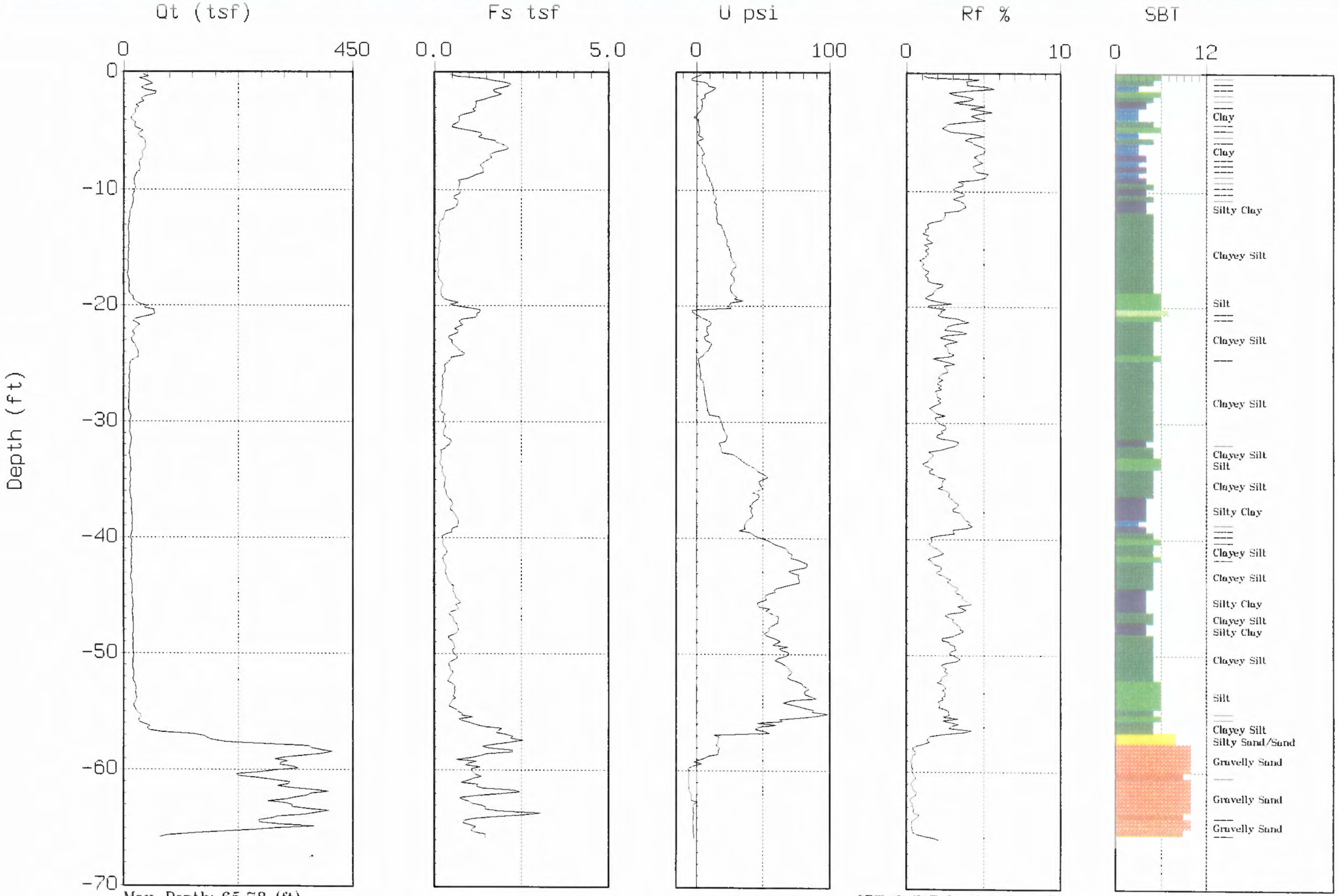
Figure 7

J:\ENGCAD\6730\CM#261.DWG 03/11/99 CM#505.PCP

LFR LEVINE.FRICKE

Site: #261
Location : 261-CP-01

Geologist: Andy Lojo
Date : 11:02:98 11:30



Max. Depth: 65.78 (ft)

Depth Inc.: 0.164 (ft)

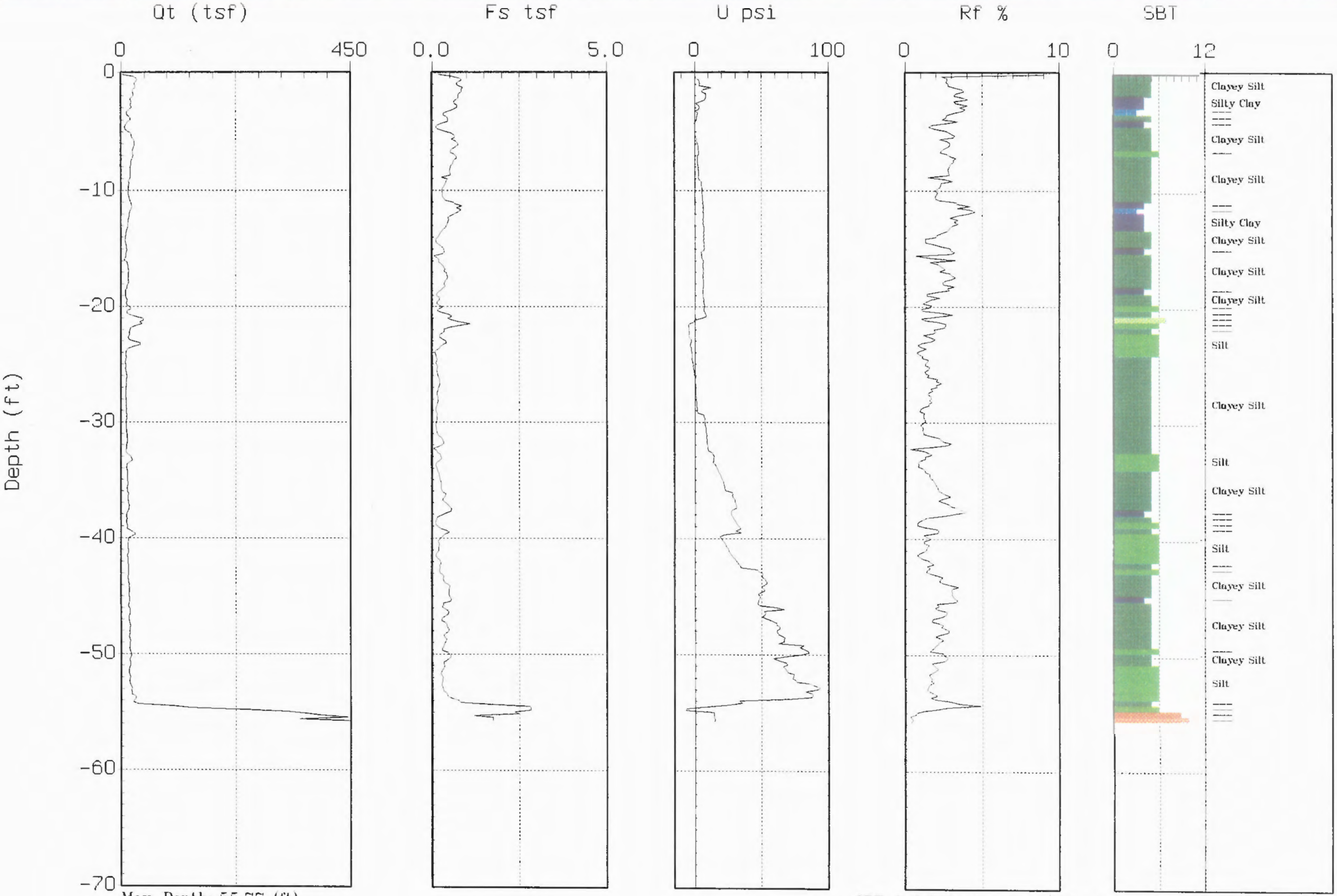
SBT: Soil Behavior Type (Robertson and Campanella 1988)

GREGG

LFR LEVINE.FRICKE

Site: #261
Location : 261-CP-02

Geologist: Andy Lojo
Date : 11:02:98 13:40



Max. Depth: 55.77 (ft)

Depth Inc.: 0.164 (ft)

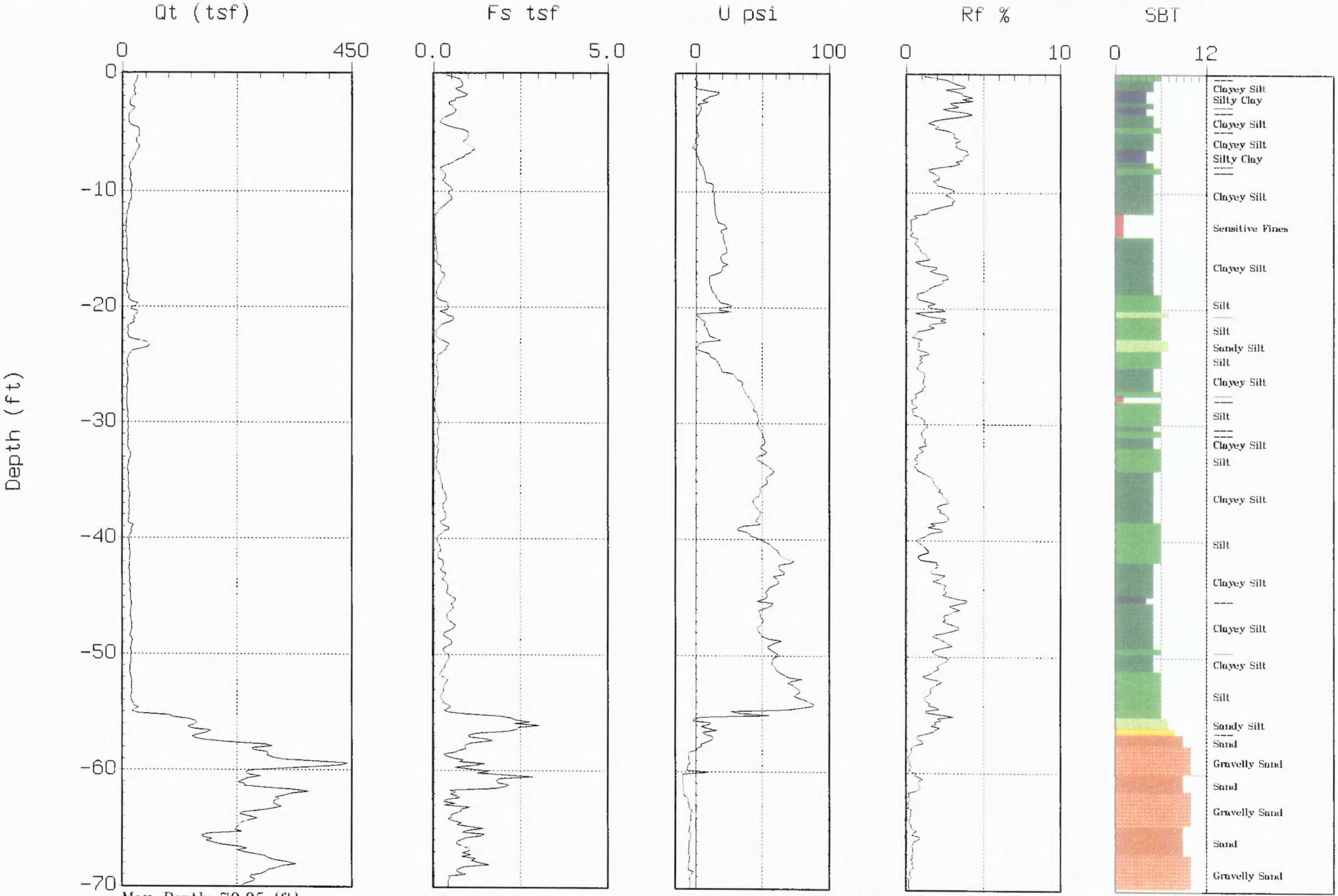
SBT: Soil Behavior Type (Robertson and Campanella 1988)

GREGG

LFR LEVINE.FRICKE

Site: #261
Location : 261-CP-03

Geologist: Andy Lojo
Date : 11:02:98 17:15



Max. Depth: 70.05 (ft)

Depth Inc.: 0.164 (ft)

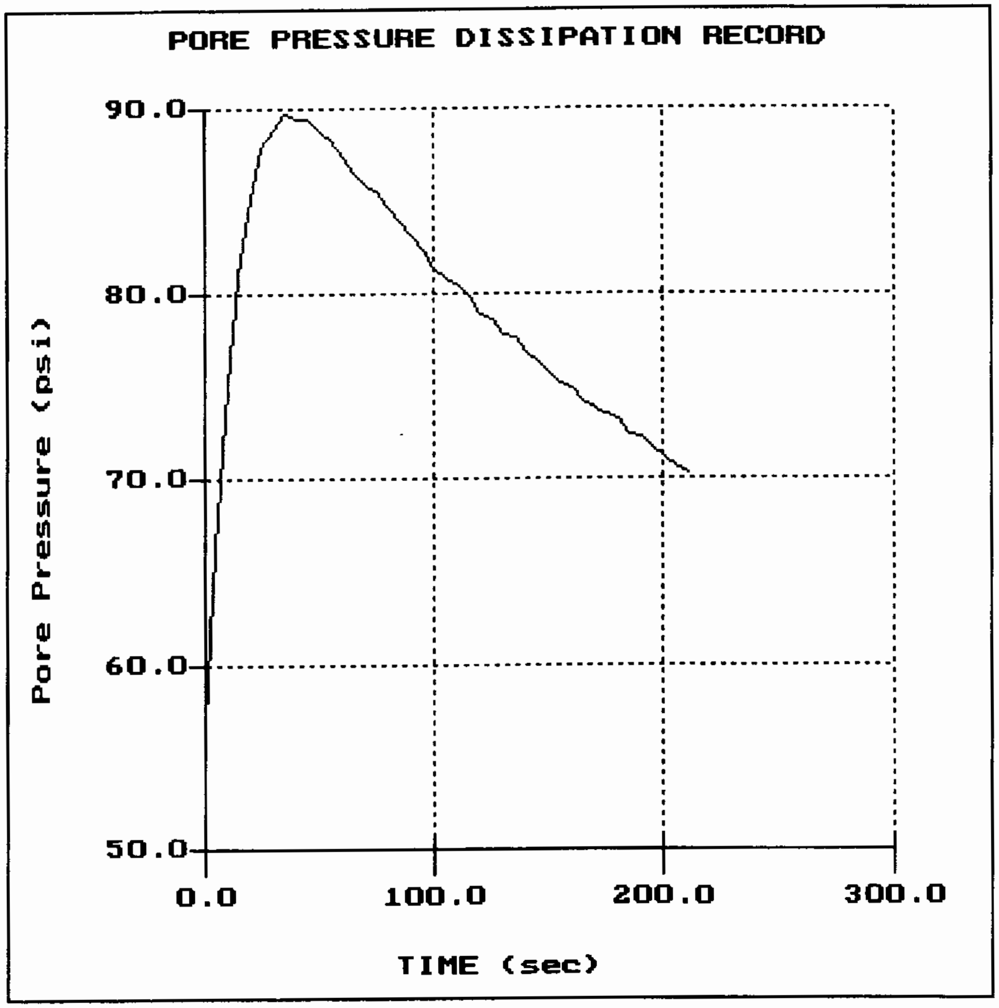
SBT: Soil Behavior Type (Robertson and Campanella 1988)

LFR LEVINE FRICKE

Hole:CPT261A
Location:#261

Cone:20 TON AD071
Date:11:02:98 11:30

File: 108C01.PPR
Depth (m): 15.00
(ft): 49.21
Duration : 210.0s

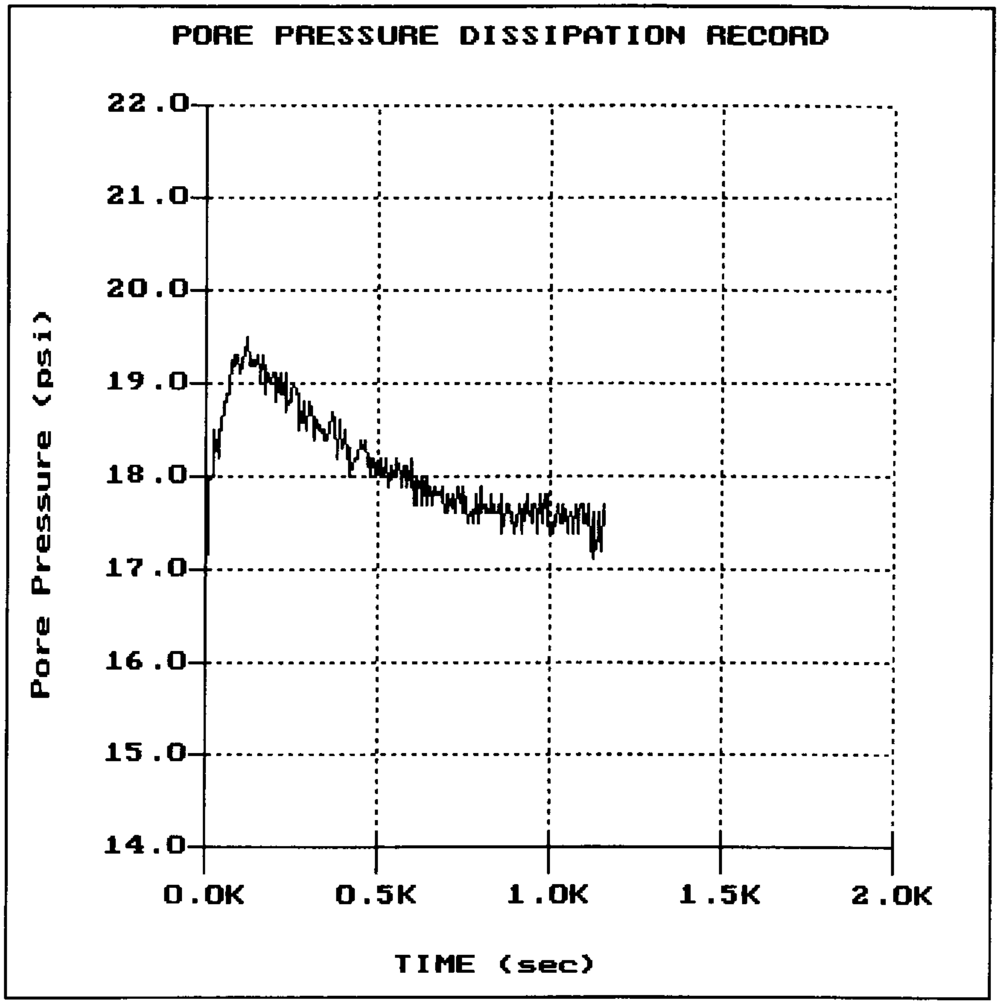


LFR LEVINE FRICKE

Hole:CPT261A
Location:#261

Cone:20 TON AD071
Date:11:02:98 11:30

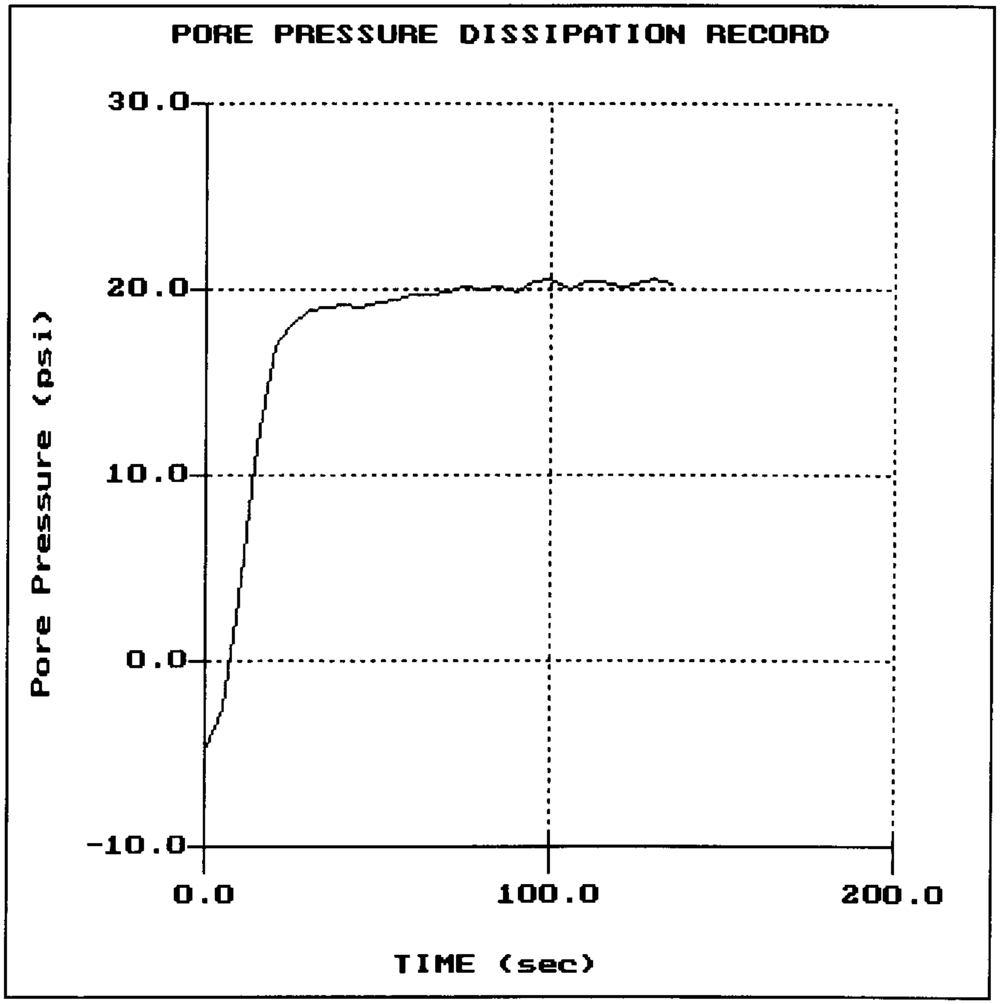
File: 108C01.PPR
Depth (m): 17.65
(ft): 57.91
Duration : 1155.0s



LFR LEVINE FRICKE

Hole:CPT261A
Location:#261

Cone:20 TON AD071
Date:11:02:98 11:30


PORE PRESSURE DISSIPATION RECORD

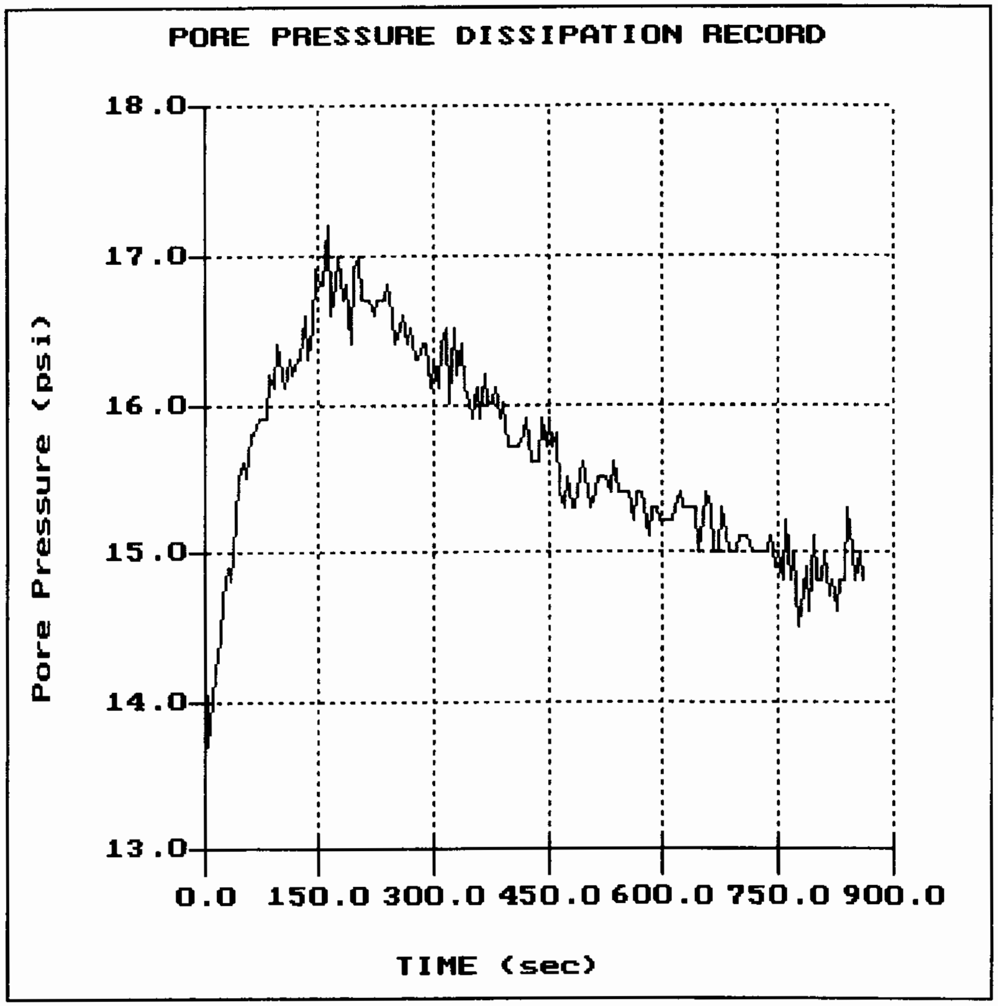
File: 108C01.PPR
Depth (m): 18.05
(ft): 59.22
Duration : 135.0s

LFR LEVINE FRICKE

Hole: 261-CP-02
Location:#261

Cone:20 TON AD071
Date:11:02:98 13:40

File: 108C02.PPR
Depth (m): 16.90
(ft): 55.45
Duration : 860.0s



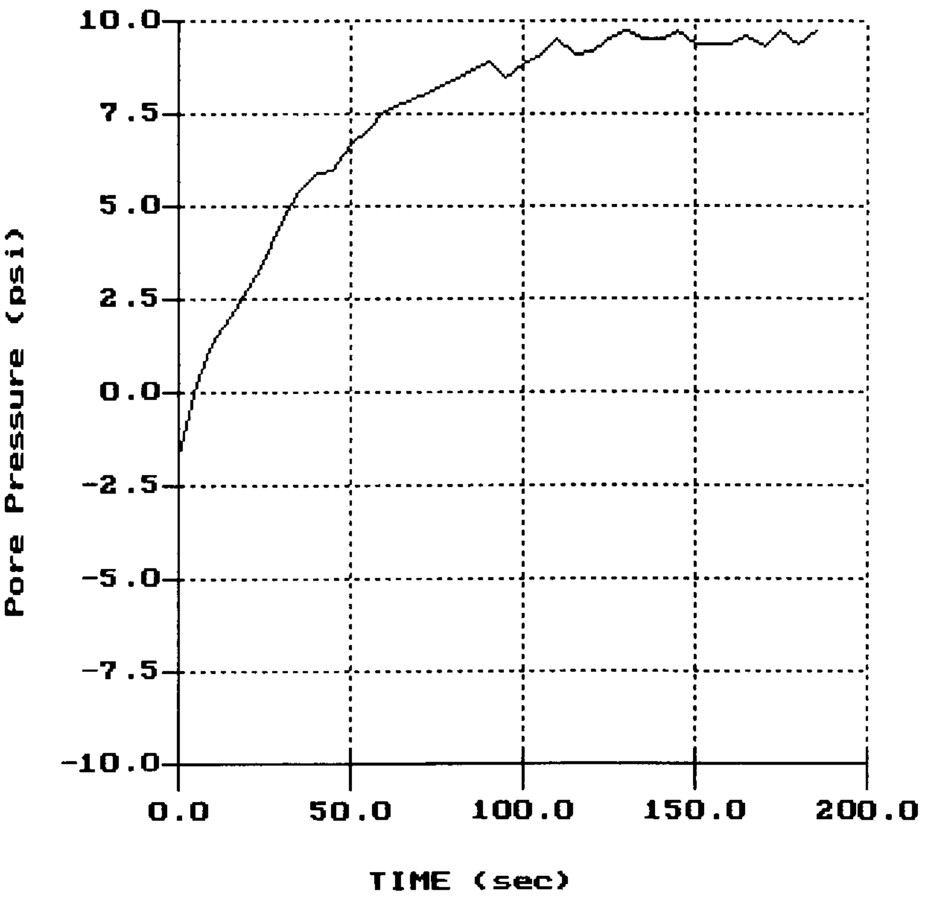
LFR LEVINE FRICKE

Hole:261-CP-03
Location:#261

Cone:20 TON AD071
Date:11:02:98 17:15

File: 108C03.PPR
Depth (m): 6.25
(ft): 20.51
Duration : 185.0s

PORE PRESSURE DISSIPATION RECORD



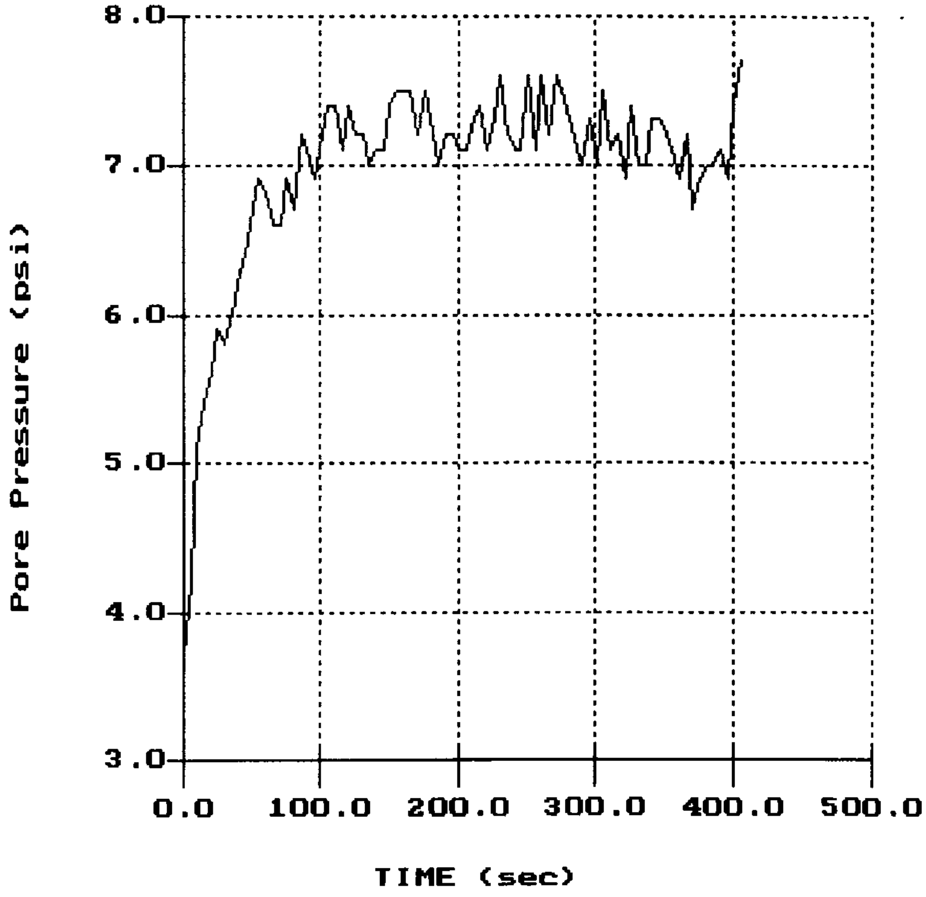
LFR LEVINE FRICKE

Hole:261-CP-03
Location:#261

Cone:20 TON AD071
Date:11:02:98 17:15

File: 108C03.PPR
Depth (m): 6.35
(ft): 20.83
Duration : 405.0s

PORE PRESSURE DISSIPATION RECORD

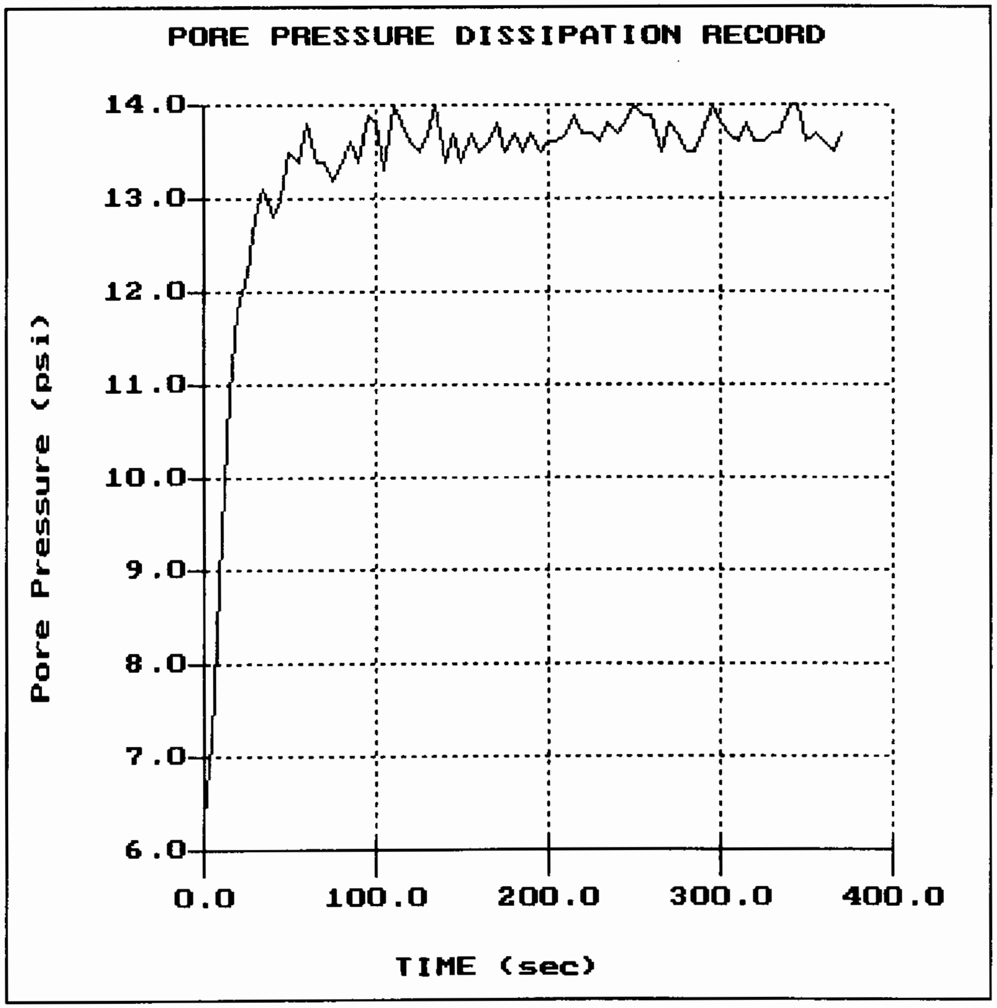


LFR LEVINE FRICKE

Hole:261-CP-03
Location:#261

Cone:20 TON AD071
Date:11:02:98 17:15

File: 108C03.PPR
Depth (m): 17.20
(ft): 56.43
Duration : 370.0s



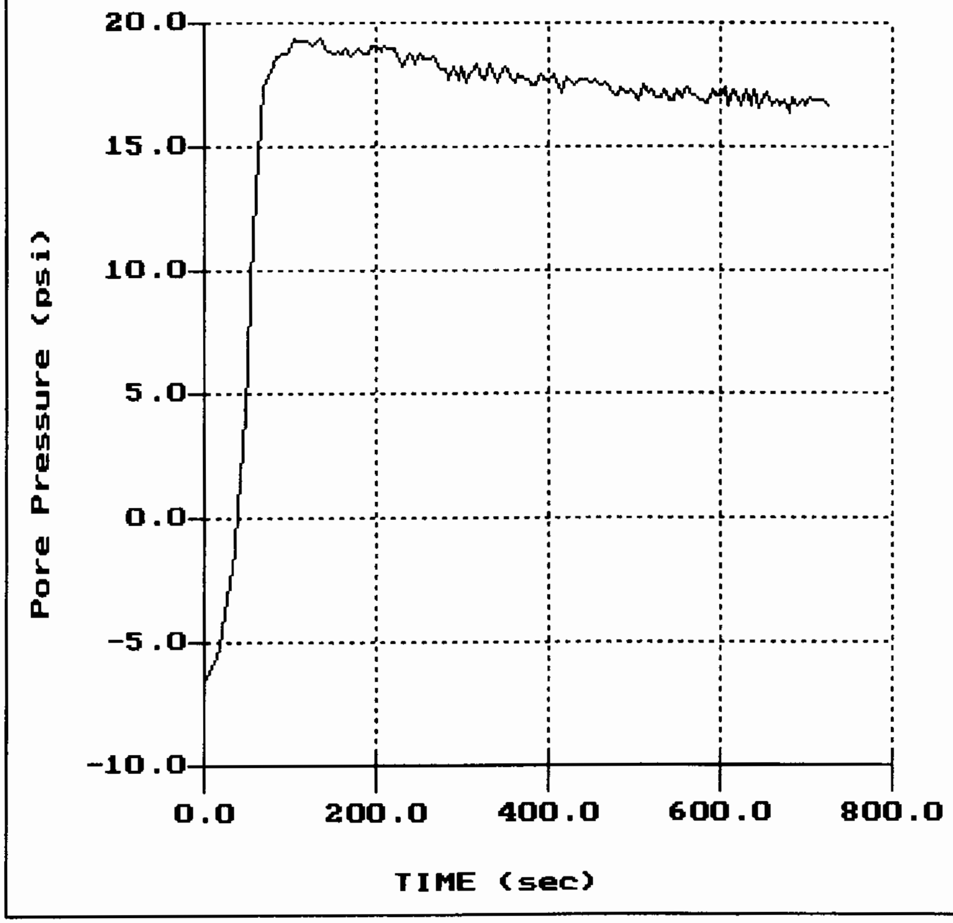
LFR LEVINE FRICKE

Hole:261-CP-03
Location:#261

Cone:20 TON AD071
Date:11:02:98 17:15

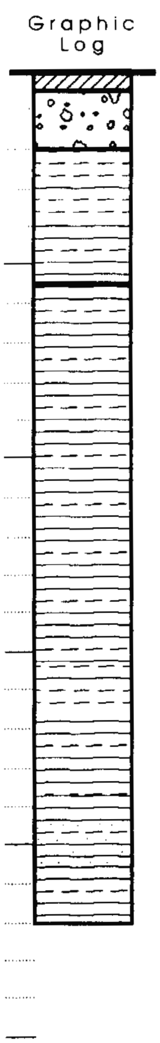
File: 108C03.PPR
Depth (m): 18.25
(ft): 59.88
Duration : 725.0s

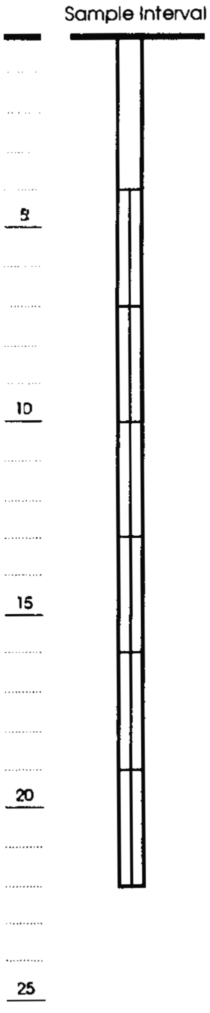
PORE PRESSURE DISSIPATION RECORD



SCVWD PILOT STUDY

Depth, feet	Water Level	PID Reading (ppm)	Lithologic Description
			ASPHALT Pavement.
			GRAVEL (GM), dark gray, engineered Fill.
			CLAYEY SILT - SILTY CLAY (ML-CL), very dark gray, slightly moist, low plasticity, stiff.
		5.2	
			More silty, color grades to dark brown.
5		0.6	
			SILTY CLAY (CL), dark brown to dark yellowish brown, moist, moderate plasticity, soft, slightly sandy (fine sand).
		0.2	
		4.6	
10		5.6	Increasingly more moist, soft, color to yellowish brown, more clayey.
		2.0	
15		7.0	
			Soft, very moist, yellowish brown silty clay to clayey silt.
	▼		
20		2.0	Increase fine sand content.
			BOTTOM OF BORING AT 22 FEET.
25			
30			
35			





JENIFER J. BEATTY
No. 6650
Exp. 4/31/01

Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: November 16, 1998
LFR Geologist: Thomas Zakaria, R.G., CH.G.

EXPLANATION

▤ Clay
┄ Silt
░ Sand
▒ Gravel

PID - Photoionization Detector

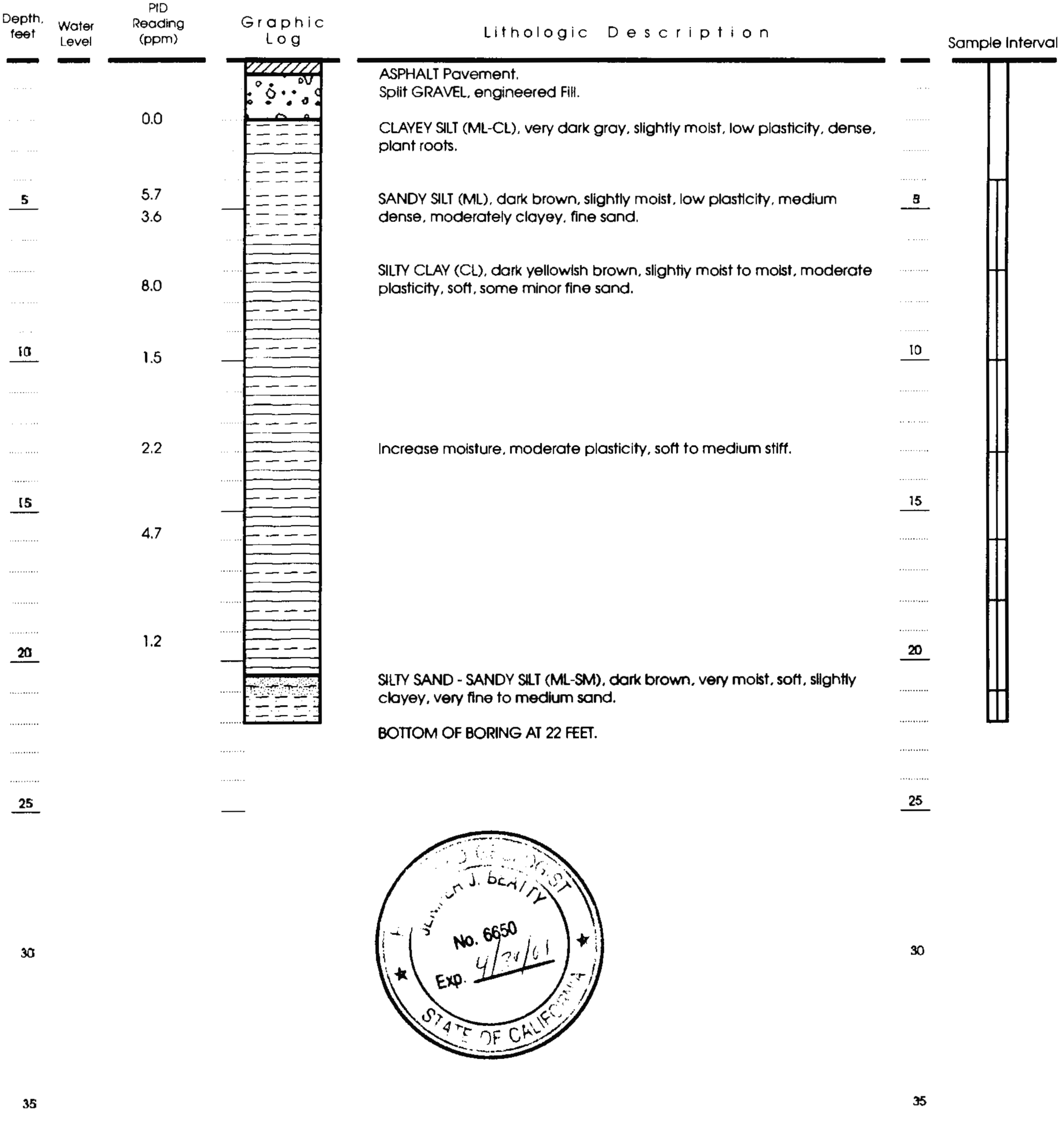
▼ Water level at time of drilling

LFR
LEVINE•FRICKE

LITHOLOGY FOR 261-BH-01 *(page 1 of 1)*

Project No. 6730.00-024

SCVWD PILOT STUDY



ASPHALT Pavement.
Split GRAVEL, engineered Fill.

CLAYEY SILT (ML-CL), very dark gray, slightly moist, low plasticity, dense, plant roots.

SANDY SILT (ML), dark brown, slightly moist, low plasticity, medium dense, moderately clayey, fine sand.

SILTY CLAY (CL), dark yellowish brown, slightly moist to moist, moderate plasticity, soft, some minor fine sand.

Increase moisture, moderate plasticity, soft to medium stiff.

SILTY SAND - SANDY SILT (ML-SM), dark brown, very moist, soft, slightly clayey, very fine to medium sand.

BOTTOM OF BORING AT 22 FEET.

J. BEATTY
No. 6650
Exp. 4/30/01

EXPLANATION

☰	Clay
☷	Silt
░	Sand
▒	Gravel

PID - Photoionization Detector

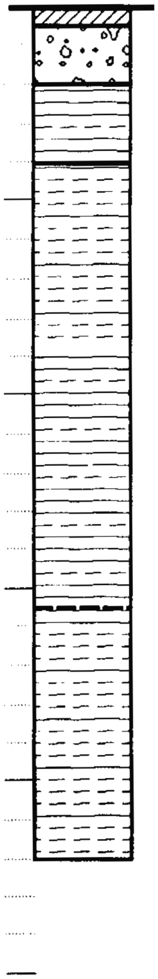
Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: November 16, 1998
LFR Geologist: Thomas Zakaria, R.G., CH.G.

LFR
LEVINE•FRICKE

LITHOLOGY FOR 261-BH-02 *(page 1 of 1)*

Project No. 6730.00-024

SCVWD PILOT STUDY



Depth, feet	Water Level	PID Reading (ppm)	Lithologic Description	Sample Interval
			ASPHALT Pavement. GRAVEL, engineered Fill.	
		2.2	SILTY CLAY (CL), very dark gray, slightly moist, gravelly.	
		150.0		
5			CLAYEY SILT - SILTY CLAY (ML-CL), dark brown, slightly moist, moderate plasticity, medium dense, slightly sandy, fine sand.	5
		19.8		
			Increasingly more clayey.	
			Color more dark grayish brown.	
10		2.6		10
		3.8		
15				15
			CLAYEY SILT (ML), dark yellowish brown, slightly moist to moist, moderate plasticity, soft, slightly sandy (fine sand).	
		0.0		
20			Increasing sand (fine sand).	20
			BOTTOM OF BORING AT 22 FEET.	
25				25
30				30
35				35

No. 6650
Exp. 4/31/01

Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: November 16, 1998
LFR Geologist: Thomas Zakaria, R.G., CH.G.

EXPLANATION

▤	Clay
☰	Silt
⛆	Sand
⁘	Gravel

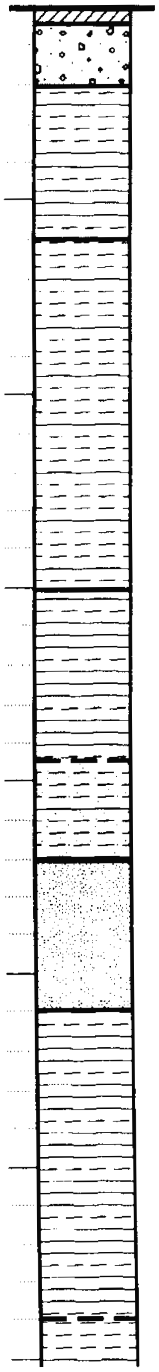
PID - Photoionization Detector

LFR
LEVINE•FRICKE

LITHOLOGY FOR 261-BH-03 *(page 1 of 1)*

Project No. 6730.00-024

SCVWD PILOT STUDY



Depth, feet	Water Level	PID Reading (ppm)	Lithologic Description		Sample Interval
			ASPHALT Pavement.		
			SANDY GRAVEL, engineered Fill.		
			CLAYEY SILT/SILTY CLAY (ML-CL), dark brown, moist, medium plasticity, soft.		
		27.0			
5				5	
		1.0			
			CLAYEY SILT (ML), light brown, moist, medium to low plasticity, soft.		
10				10	
	▼	11.0			
			CLAYEY SILT (ML), light brown, wet, medium to high plasticity, very soft, trace very fine sand.		
		0.0			
15				15	
			SILTY CLAY (CL), light brown, very moist, medium to high plasticity, very soft.		
			CLAYEY SANDY SILT (ML/SW), light yellowish brown, saturated, medium to high plasticity, very loose. U ufflable- slumps out of tube when hit with hammer.		
20		0.5		20	
			SAND (SP), light yellowish brown, saturated, loose, very fine grained (60).		
		0.0			
25				25	
			SILTY CLAY (CL), very dark grayish brown, very moist to saturated, high plasticity, very soft.		
		0.0			
30				30	
		0.0			
			CLAYEY SILT (ML), very dark grayish brown, very moist, medium plasticity, soft.		
35				35	

cont....

Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: November 16, 1998
LFR Geologist: Andy Lojo, R.G.

No. 6650
Exp. 9/29/01

EXPLANATION

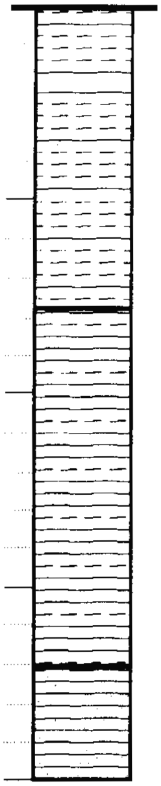
▤	Clay
☰	Silt
░	Sand
▒	Gravel
▯	PID - Photoionization Detector
▼	Water level at time of drilling

LFR
LEVINE•FRICKE

LITHOLOGY FOR 261-BH-04 *(page 1 of 2)*

Project No. 6730.00-024

SCVWD PILOT STUDY

Depth, feet	Water Level	PID Reading (ppm)	Graphic Log	Lithologic Description	Depth, feet	Sample Interval
		0.0		CLAYEY SILT (ML).		
		0.0		Very fine sand.		
40					40	
		0.0		CLAYEY SILT (as above).		
		0.0		SILTY CLAY (CL), dark bluish gray with gray mottles, moist, medium to high plasticity, soft.		
45					45	
		0.0				
50					50	
		0.0				
				SANDY CLAY (CL), same color, moist, low plasticity, stiff, fine sand.		
		0.0		BOTTOM OF BORING AT 55 FEET.		
55					55	
60					60	
65					65	
70					70	

No. 6650
Exp. 4/30/01
STATE OF CALIFORNIA

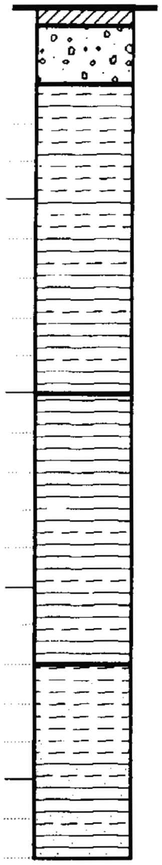
Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: November 16, 1998
LFR Geologist: Andy Lojo, R.G.

EXPLANATION

▤	Clay	▯	PID - Photoionization Detector
▤	Silt	▼	Water level at time of drilling
░	Sand		
▒	Gravel		

LFR
LEVINE•FRICKE

SCVWD PILOT STUDY



Depth, feet	Water Level	PID Reading (ppm)	Lithologic Description
			ASPHALT Pavement.
			SANDY GRAVEL, engineered Fill.
			CLAYEY SILT - SILTY CLAY (ML-CL), very dark gray, slightly moist, low plasticity, soft to medium stiff, slightly sandy.
5		0.8	
		0.6	
		1.0	
10			
	▼	0.2	CLAY - SILTY CLAY (CL), yellowish brown, moist, medium plasticity, soft.
		0.6	
15			
		0.4	
			Increase sand content, very moist to wet.
		0.0	SANDY SILT - SANDY CLAY (ML-CL), dark yellowish brown, saturated, medium plasticity, soft, 15 to 30 very fine sand.
			Increase sand content, (30) very fine sand.
20			
		0.0	
			BOTTOM OF BORING AT 22 FEET.
25			
30			
35			

Sample Interval

No. 6650
Exp. 9/30/01

Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: November 17, 1998
LFR Geologist: Thomas Zakaria, R.G., CH.G.

EXPLANATION

▤	Clay
▭	Silt
░	Sand
▨	Gravel

PID - Photoionization Detector

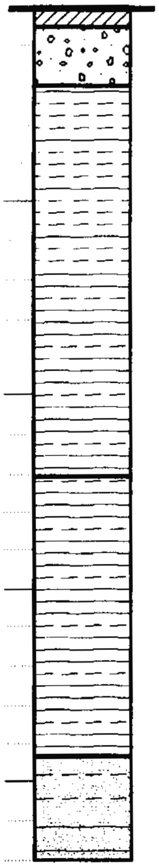
▼ Water level at time of drilling

LITHOLOGY FOR 261-BH-05 *(page 1 of 1)*

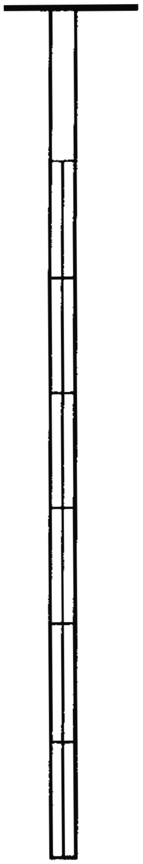
SCVWD PILOT STUDY

Depth, feet	Water Level	PID Reading (ppm)	Lithologic Description
			ASPHALT Pavement. SANDY GRAVEL (engineered Fill).
			CLAYEY SILT - SILTY CLAY (ML-CL), very dark gray to very dark brown, slightly moist, low to moderate plasticity, soft to medium stiff, slightly sandy (fine sand).
5		0.8	
		1.4	
10		1.0	
			SILTY CLAY (CL), dark yellowish brown, moist, moderate plasticity, soft, same very fine sand.
		1.2	
15	▼	1.9	
		0.4	
			Soft, wet/saturated
20		0.3	SILTY SAND - CLAYEY SAND (SM-SC), yellowish brown, saturated, moderate plasticity, soft, (40 fines), very fine sand.
		0.0	BOTTOM OF BORING AT 22 FEET.
25			
30			
35			

Graphic Log



Sample Interval



JENNIFER J. BEATTY
No. 6650
Exp. 4/30/01

EXPLANATION

▤ Clay

▭ Silt

▨ Sand

▦ Gravel

PID - Photoionization Detector

▼ Water level at time of drilling

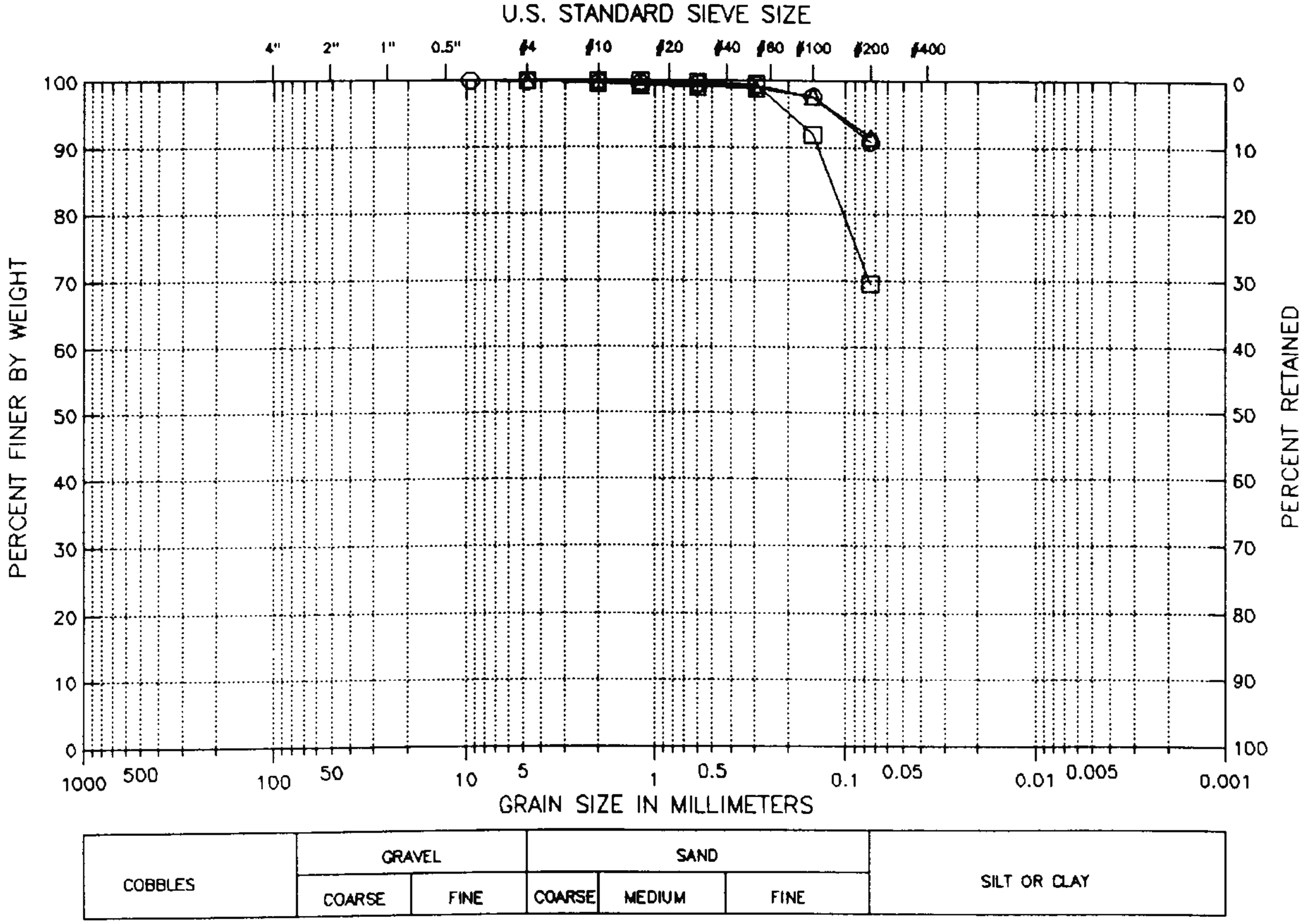
Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: November 17, 1998
LFR Geologist: Thomas Zakaria, R.G., CH.G.

LFR
LEVINE•FRICKE

LITHOLOGY FOR 261-BH-06 *(page 1 of 1)*

Project No. 6730.00-024

Project : LEVINE FRICKE RECON 6730.00-024
Project No.: 16148A
Location: SCVWD MTBE
Date : Wed Dec 23 1998



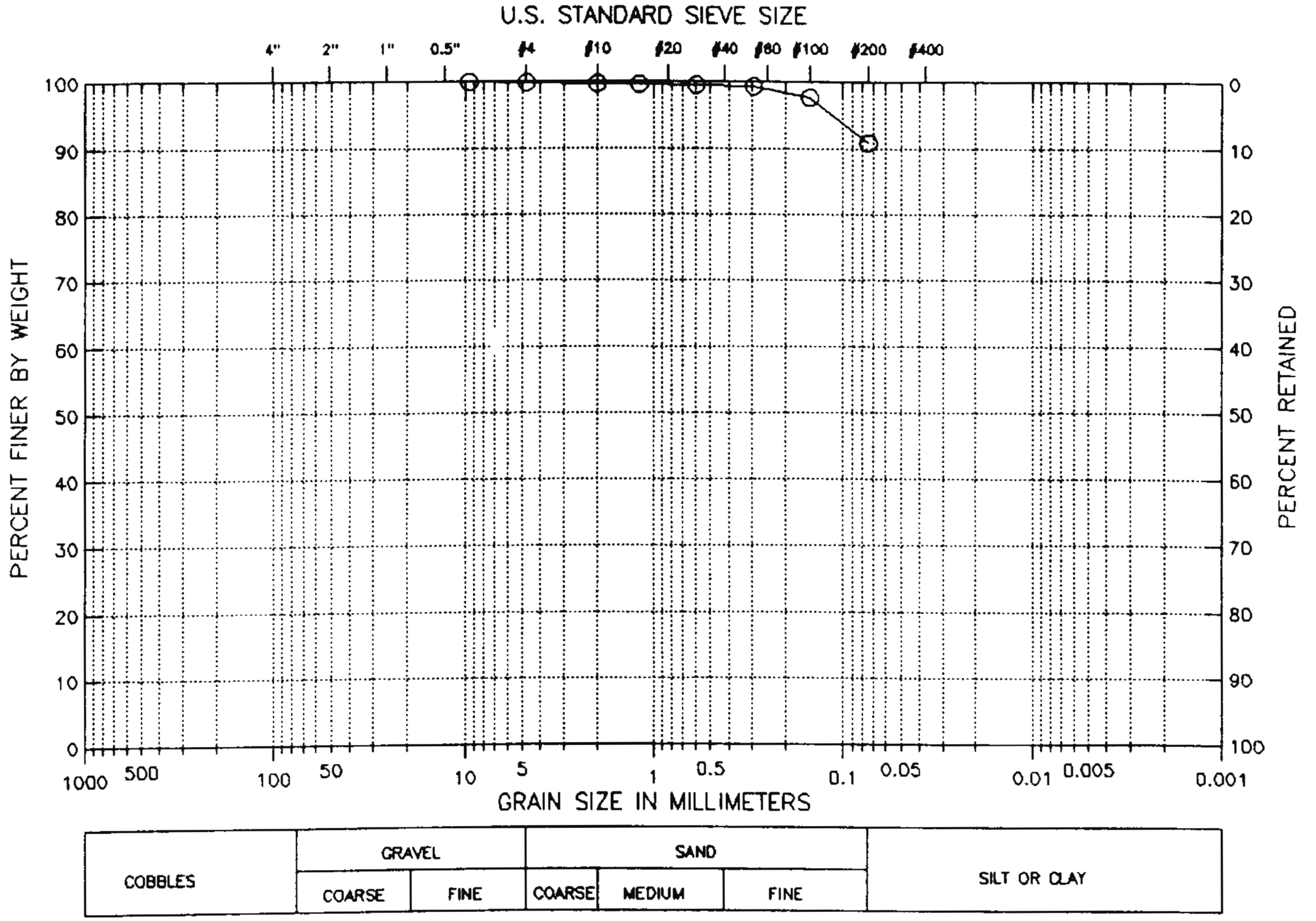
Symbol	Boring No.	Sample No.	Depth	Filename	Classification / Description
-○-	261-BH-05	6	5.5-6.0 FT.	261-06	BROWN SILTY CLAY
-△-	261-BH-05	8.5	7.5-8.5 FT.	261-08	BROWN SILTY CLAY
-□-	261-BH-05	19	18.0-19.0 FT.	261-19	BROWN FINE SANDY SILTY CLAY

Figure 1

URS Greiner Woodward Clyde

Boring No. : 261-BH-05
Sample No.: 6
Tested by : J. HEBEL
Filename : 261-06

Project : LEVINE FRICKE RECON 6730.00-024
Project No.: 16148A
Location: SCVWD MTBE
Date : Wed Dec 23 1998



Classification :

Visual Description :
BROWN SILTY CLAY

Remarks :
Depth: 5.5-6.0 feet

Figure 1

URS Greiner Woodward Clyde

Wed Dec 23 12:33:59 1998

GEOTECHNICAL LABORATORY TEST DATA

Project : LEVINE FRICKE RECON 6730.00-024		Filename : 261-06
Project No. : 16148A	Depth : 5.5-6.0 FT.	Elevation : NA
Boring No. : 261-BH-05	Test Date : 12/23/98	Tested by : J. HEBEL
Sample No. : 6	Test Method : ASTM D422	Checked by : S. CAPPS

Location : SCVWD MTBE
Soil Description : BROWN SILTY CLAY
Remarks : Depth: 5.5-6.0 feet

COARSE SIEVE SET

Sieve Mesh	Sieve Openings Inches	Sieve Openings Millimeters	Weight Retained (gm)	Cumulative Weight Retained (gm)	Percent Finer (%)
0.375"	0.374	9.51	0.00	0.00	100
#4	0.187	4.75	0.18	0.18	100
#10	0.079	2.00	0.31	0.49	100
#16	0.047	1.19	0.21	0.70	100
#30	0.023	0.60	0.21	0.91	100
#50	0.012	0.30	0.34	1.25	99
#100	0.006	0.15	3.04	4.29	98
#200	0.003	0.07	12.93	17.22	91

Total Dry Weight of Sample = 190.1

D85 : N/A
D60 : N/A
D50 : N/A
D30 : N/A
D15 : N/A
D10 : N/A

Soil Classification
ASTM Group Symbol : N/A
ASTM Group Name : N/A
AASHTO Group Symbol : A-4(0)
AASHTO Group Name : Silty Soils

GEOTECHNICAL LABORATORY TEST DATA

Project : LEVINE FRICKE RECON 6730.00-024
Filename : 261-06
Project No. : 16148A
Depth : 5.5-6.0 FT.
Elevation : NA
Boring No. : 261-BH-05
Test Date : 12/23/98
Tested by : J. HEBEL
Sample No. : 6
Test Method : ASTM D422
Checked by : S. CAPPS
Location : SCVWD MTBE
Soil Description : BROWN SILTY CLAY
Remarks : Depth: 5.5-6.0 feet

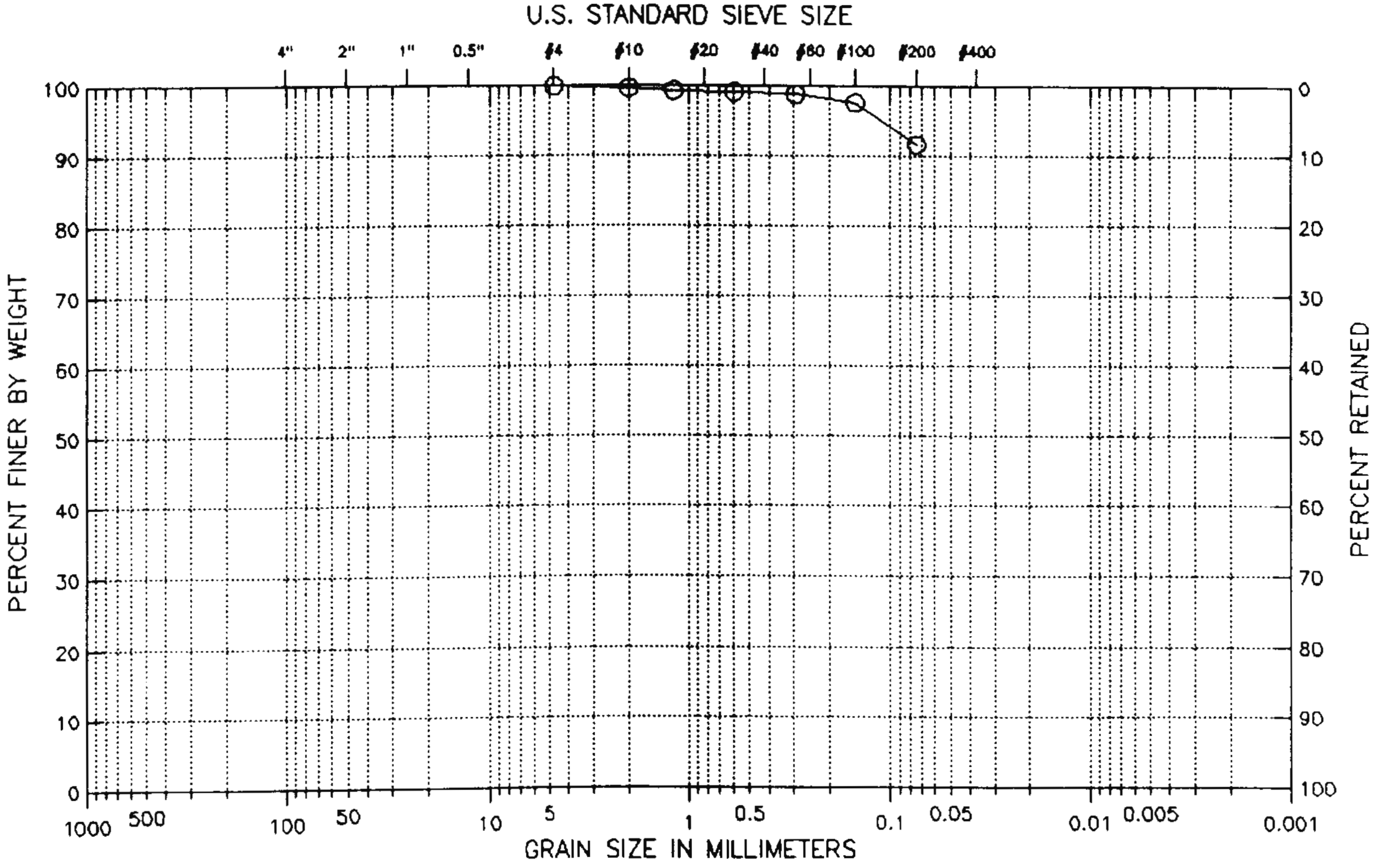
Natural Moisture Content

	Moisture Content ID	Mass of Container (gm)	Mass of Container and Moist Soil (gm)	Mass of Container and Dried Soil (gm)	Moisture Content (%)
1)	261-06	206.50	431.40	396.60	18.31

Average Moisture Content = 18.31

Boring No. : 261-BH-05
Sample No.: 8.5
Tested by : J. HEBEL
Filename : 261-08

Project : LEVINE FRICKE RECON 6730.00-024
Project No.: 16148A
Location: SCWWD MTBE
Date : Wed Dec 23 1998



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

Classification :

Visual Description :
BROWN SILTY CLAY

Remarks :
Depth: 7.5-8.8 feet

Figure 2

URS Greiner Woodward Clyde

Wed Dec 23 12:34:04 1998

GEOTECHNICAL LABORATORY TEST DATA

Project : LEVINE FRICKE RECON 6730.00-024

Filename : 261-08

Project No. : 16148A

Depth : 7.5-8.5 FT.

Elevation : NA

Boring No. : 261-BH-05

Test Date : 12/23/98

Tested by : J. HEBEL

Sample No. : 8.5

Test Method : ASTM D422

Checked by : S. CAPPS

Location : SCVWD MTBE

Soil Description : BROWN SILTY CLAY

Remarks : Depth: 7.5-8.B feet

COARSE SIEVE SET

Sieve Mesh	Sieve Openings Inches	Sieve Openings Millimeters	Weight Retained (gm)	Cumulative Weight Retained (gm)	Percent Finer (%)
#4	0.187	4.75	0.00	0.00	100
#10	0.079	2.00	1.05	1.05	100
#16	0.047	1.19	0.96	2.01	99
#30	0.023	0.60	0.70	2.71	99
#50	0.012	0.30	0.74	3.45	99
#100	0.006	0.15	3.53	6.98	98
#200	0.003	0.07	1B.73	25.71	92

Total Dry Weight of Sample = 309.2

D85 : N/A
D60 : N/A
D50 : N/A
D30 : N/A
D15 : N/A
D10 : N/A

Soil Classification

ASTM Group Symbol : N/A
ASTM Group Name : N/A
AASHTO Group Symbol : A-4(0)
AASHTO Group Name : Silty Soils

```
Wed Dec 23 12:34:04 1998                                                                   Page :  2

                                    GEOTECHNICAL LABORATORY TEST DATA

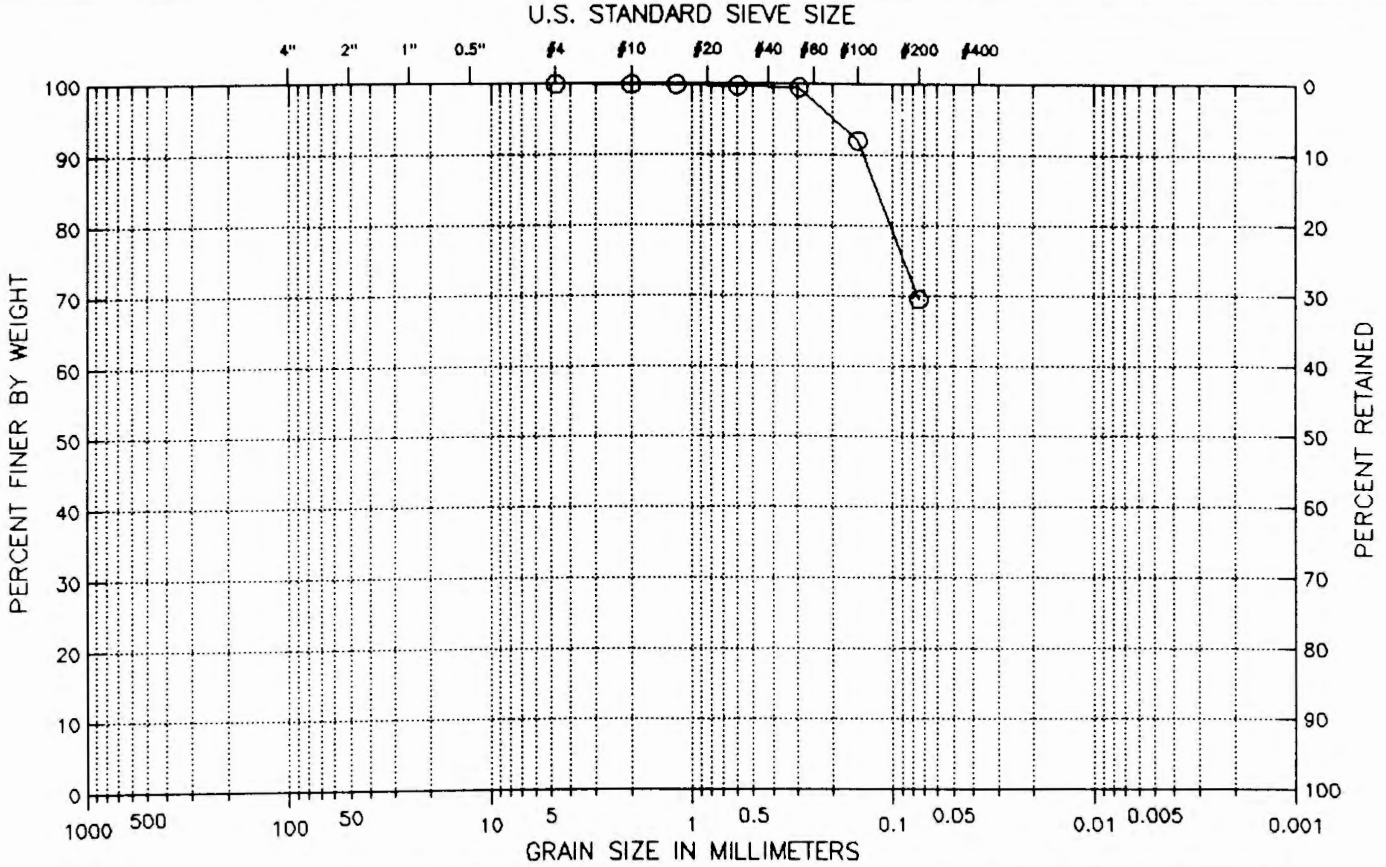
Project : LEVINE FRICKE RECON  6730.00-024                            Filename : 261-08
Project No. : 16148A             Depth : 7.5-8.5 FT.                  Elevation : NA
Boring No. : 261-BH-05           Test Date : 12/23/98                 Tested by : J. HEBEL
Sample No. : 8.5                 Test Method : ASTM D422              Checked by : S. CAPPS
Location : SCVWD  MTBE
Soil Description : BROWN SILTY CLAY
Remarks : Depth:  7.5-8.8 feet

                                        Natural Moisture Content
   Moisture Content   Mass of Container  Mass of Container  Mass of Container  Moisture Content
   ID                                    and Moist Soil     and Dried Soil
                            (gm)               (gm)               (gm)               (%)
   -----------------  -----------------  -----------------  -----------------  -----------------
1) 261-08                       219.60             589.70             528.80              19.70

     Average Moisture Content = 19.70
```

Boring No. : 261-BH-05
Sample No.: 19
Tested by : J. HEBEL
Filename : 261-19

Project : LEVINE FRICKE RECON 6730.00-024
Project No.: 16148A
Location: SCVWD MTBE
Date : Wed Dec 23 1998



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

Classification :

Visual Description :
BROWN FINE SANDY SILTY CLAY

Remarks :
Depth: 18.0-19.0 feet

Figure 3

URS Greiner Woodward Clyde

```
Wed Dec 23 12:34:11 1998                                                                Page :  1

                                    GEOTECHNICAL LABORATORY TEST DATA

Project : LEVINE FRICKE RECON  6730.00-024                           Filename : 261-19
Project No. : 16148A               Depth : 18.0-19.0 FT.             Elevation : NA
Boring No. : 261-BH-05             Test Date : 12/23/98              Tested by : J. HEBEL
Sample No. : 19                    Test Method : ASTM D422           Checked by : S. CAPPS
Location : SCVWD  MTBE
Soil Description : BROWN FINE SANDY SILTY CLAY
Remarks : Depth:  18.0-19.0 feet

                                   COARSE SIEVE SET
Sieve          Sieve Openings          Weight       Cumulative           Percent
Mesh           Inches   Millimeters    Retained     Weight Retained      Finer
                                       (gm)         (gm)                 (%)
----------     ------   -----------    --------     ---------------      -------
#4              0.187        4.75          0.00                0.00          100
#10             0.079        2.00          0.10                0.10          100
#16             0.047        1.19          0.22                0.32          100
#30             0.023        0.60          0.37                0.69          100
#50             0.012        0.30          0.69                1.38           99
#100            0.006        0.15         20.26               21.64           92
#200            0.003        0.07         61.38               83.02           70
     Total Dry Weight of Sample = 272.7

 D85 : 0.1196 mm
 D60 : N/A
 D50 : N/A
 D30 : N/A
 D15 : N/A
 D10 : N/A

 Soil Classification
        ASTM Group Symbol    : N/A
        ASTM Group Name      : N/A
        AASHTO Group Symbol  : A-4(0)
        AASHTO Group Name    : Silty Soils
```

```
                        GEOTECHNICAL LABORATORY TEST DATA

Project : LEVINE FRICKE RECON  6730.00-024                    Filename : 261-19
Project No. : 16148A            Depth : 18.0-19.0 FT.         Elevation : NA
Boring No. : 261-BH-05          Test Date : 12/23/98          Tested by : J. HEBEL
Sample No. : 19                 Test Method : ASTM D422       Checked by : S. CAPPS
Location : SCVWD  MTBE
Soil Description : BROWN FINE SANDY SILTY CLAY
Remarks : Depth:  18.0-19.0 feet

                                   Natural Moisture Content
   Moisture Content  Mass of Container  Mass of Container  Mass of Container  Moisture Content
   ID                                   and Moist Soil     and Dried Soil
                           (gm)               (gm)               (gm)               (%)
   ----------------- -----------------  -----------------  -----------------  -----------------
1) 261-19                    226.50             562.30             499.20              23.14

     Average Moisture Content = 23.14
```

SANTA CLARA VALLEY WATER DISTRICT

Pilot Study of Operating Underground Storage Tanks

Santa Clara County, California

Site Report

SITE NUMBER 287

Shell Oil Company
1610 Meridian Road
San Jose, California 95125

May 7, 1999

This Site Report is one of a series of reports prepared for the Santa Clara Valley Water District's Pilot Study of Operating Underground Storage Tanks. The District funded this study to assess if MtBE is being released from UST systems that meet 1998 federal- and state-mandated upgrade requirements. The District will use the results of the Pilot Study, and possibly information obtained during subsequent investigations, to evaluate whether up-graded UST systems that handle MtBE are protective of groundwater quality, and ultimately drinking water. This Study and other District groundwater vulnerability assessments are critical in formulating a plan to protect drinking water supplies into the future.

With cooperation from the site owner and operator and the assistance of the San Jose Fire Department, LFR Levine·Fricke completed a file review, site inspection, and soil-gas, soil, and groundwater sampling at this site on behalf of the District. LFR's subcontractor, Integrated Engineering Services, completed a UST inspection at this site. This report provides a brief summary of investigation findings, and site-specific data in tables, figures, and appendices. This Site Report is appended to the Summary Report for the Study.

LFR
LEVINE•FRICKE
1900 Powell Street, 12th Floor
Emeryville, California 94608-1827
(510) 652-4500/Fax (510) 652-2246

SUMMARY OF FINDINGS

SITE DESCRIPTION

Figure 1 illustrates the site location. Site geology consists primarily of silts and clays to approximately 32 feet below ground surface (bgs) underlain by sands to approximately 40 to 45 feet bgs. Silts and clays were encountered beneath the sands to approximately 50 feet bgs, underlain by sands. The shallowest depth to water measured was approximately 73.5 feet bgs (January 1999).

SYSTEM DESCRIPTION

The UST system at the site consists of three 10,000-gallon gasoline USTs and one 10,000-gallon diesel UST. All tanks are constructed of single-walled fiberglass with single-walled fiberglass piping. The UST system utilizes electronic line leak detection for piping leak detection and automatic tank leak detection and monthly tank testing for UST leak detection.

RESULTS

MtBE was detected in soil-gas and groundwater at this Site. MtBE was detected in 4 of 11 soil-gas samples collected at concentrations ranging from 0.022 μg/l to 20 μg/l. MtBE was not detected in any of the 8 soil samples collected. MtBE was detected in 1 of 3 groundwater samples collected at a concentration of 800 μg/l. Petroleum hydrocarbon constituents (benzene, toluene, ethylbenzene, and/or xylenes) were detected in soil-gas samples collected from all 3 sampling locations, in soil samples collected from 1 of 3 locations, and in groundwater samples collected from both groundwater sampling locations.

SITE SELECTION CRITERIA MET

1998 upgrade compliant?	Yes
On SCVWD fuel leak database?	No
Status:	Not applicable
Distance from LUST site:	Greater than 250 feet
Distance to water supply well:	Greater than 2000 feet
Access granted?	Yes
SCVWD approved?	Yes

FILE REVIEW SUMMARY

Number of tanks:	4
Reported release?	No
Release date:	Not applicable
Fuel released:	Not applicable
Location:	Not applicable
Quantity (gallons):	Not applicable
Data available:	Not applicable

Comments:

Bluelines and site plan available in file.

SITE VISIT - UST SYSTEM INFORMATION

Precision tank tightness records available?	Yes
Date of last test:	Within one year of inspection
Method of tank testing:	Vacuum/automatic tank gauging
Tank leak rate (gallons/hour):	<0.01
UST overfill prevention system present?	Yes
Type of system:	Both overfill limiter and drop tube/check-valve
Automatic shut-off?	Yes
System operational?	Yes
Overfill containment (gallons):	15
Drop tube equipped with striker plate?	Yes
Under island containment present?	Yes
Under island containment monitoring:	Liquid
Quick release dispenser hoses?	Yes
Alarm system functional?	Yes
Type:	Shut-off
Vents:	
Vent type:	Dedicated
Vent piping:	Single walled
Condition of UST turbine sump:	Good
Condition of UST flex line sump:	Good
Vapor recovery system:	Vapor assisted
Years of operation since upgrade:	Approximately 9 months
Years of operation as fueling facility:	At least 15 years
Estimated throughput:	Approximately 100,000 gallons per month
Monitoring systems operational?	Yes
Systems operations, comment:	Veederroot
Tank annular space monitoring:	None
Overfill containment monitoring system:	Liquid probe
Piping leak detection:	Combined (pressure line leak detection and liquid probe)
Is system monitored?	Yes
Station inventory records available?	Yes
Records up to date?	Yes
Records complete?	Yes
Supplier log reviewed?	Yes
Spill log reviewed?	Yes
Spill log comments:	None noted
Personnel training:	Yes

Comments:

Single walled product piping

SITE INSPECTION

Condition of apron around pumps:	Fair
Evidence of recent paving/regrading?	No
Location of recent paving/regrading:	Not applicable
Description of surface drainage?	Toward onsite drains, away from roads
Direct route for surface spills to subsurface?	No
Description of route to subsurface:	Not applicable
Other potential petroleum sources?	No
Description of other petroleum sources:	Not applicable
Nearby surface water?	No
Name of surface water:	Not applicable
Type of surface water:	Not applicable

Comments:

Operator not present for site inspection.

UST SYSTEM DATA FROM FORM B COLLECTED DURING FILE REVIEWS - TANK ID # 6834-02 Die

Date installed:	1982
Tank capacity (gallons):	10,000
Tank contents:	Diesel
Tank construction:	
Type of system:	Single wall
Tank material (primary tank):	Fiberglass
Lining compatible with 100% methanol:	No
Exterior corrosion protection:	Fiberglass reinforced plastic
Date spill containment installed:	Date not noted
Date overfill protection equipment installed:	Date not noted
Drop tube:	Yes
Striker plate:	Yes
Dispenser containment:	Yes
Piping information:	
System type:	Pressure, underground
Construction:	Single wall, underground
Material and corrosion protection:	Fiberglass pipe, underground
Leak detection:	Electronic line leak test Automatic pump shut down
Tank leak detection?	Manual inventory reconciliation Automatic tank gauging Monthly tank testing

UST SYSTEM DATA FROM FORM B COLLECTED DURING FILE REVIEWS - TANK ID # 6834-02 PC

Date installed:	1982
Tank capacity (gallons):	10,000
Tank contents:	Midgrade unleaded
Tank construction:	
Type of system:	Single wall
Tank material (primary tank):	Fiberglass
Lining compatible with 100% methanol:	No
Exterior corrosion protection:	Fiberglass reinforced plastic
Date spill containment installed:	Date not noted
Date overfill protection equipment installed:	Date not noted
Drop tube:	Yes
Striker plate:	Yes
Dispenser containment:	Yes
Piping information:	
System type:	Pressure, underground
Construction:	Single wall, underground
Material and corrosion protection:	Fiberglass pipe, underground
Leak detection:	Electronic line leak test Automatic pump shut down
Tank leak detection?	Manual inventory reconciliation Automatic tank gauging Monthly tank testing

UST SYSTEM DATA FROM FORM B COLLECTED DURING FILE REVIEWS - TANK ID # 6834-02 Pre

Date installed:	1982
Tank capacity (gallons):	10,000
Tank contents:	Premium unleaded
Tank construction:	
Type of system:	Single wall
Tank material (primary tank):	Fiberglass
Lining compatible with 100% methanol:	No
Exterior corrosion protection:	Fiberglass reinforced plastic
Date spill containment installed:	Date not noted
Date overfill protection equipment installed:	Date not noted
Drop tube:	Yes
Striker plate:	Yes
Dispenser containment:	Yes
Piping information:	
System type:	Pressure, underground
Construction:	Single wall, underground

Material and corrosion protection:	Fiberglass pipe, underground
Leak detection:	Electronic line leak test Automatic pump shut down
Tank leak detection?	Automatic tank gauging Monthly tank testing

UST SYSTEM DATA FROM FORM B COLLECTED DURING FILE REVIEWS - TANK ID # 6834-02 Reg

Date installed:	1982
Tank capacity (gallons):	10,000
Tank contents:	Regular unleaded
Tank construction:	
Type of system:	Single wall
Tank material (primary tank):	Fiberglass
Lining compatible with 100% methanol:	No
Exterior corrosion protection:	Fiberglass reinforced plastic
Date spill containment installed:	Date not noted
Date overfill protection equipment installed:	Date not noted
Drop tube:	Yes
Striker plate:	Yes
Dispenser containment:	Yes
Piping information:	
System type:	Pressure, underground
Construction:	Single wall, underground
Material and corrosion protection:	Fiberglass pipe, underground
Leak detection:	Electronic line leak test Automatic pump shut down
Tank leak detection?	Manual inventory reconciliation Automatic tank gauging Monthly tank testing

Table 1
Summary of Chemical Analysis Results for Soil-Gas Samples - Site #287
Santa Clara Valley Water District

Location	Date Sampled	Depth (ft bgs)	Methyl Tertiary Butyl Ether (MTBE) ug/L	TPH as Gasoline (TPHg) ug/L	Benzene (B) ug/L	Toluene (T) ug/L	Ethyl Benzene (E) ug/L	meta/para-Xylenes (m/p-X) ug/L	ortho-Xylene (o-X) ug/L	Notes
287-SG-01	01/06/99	12.5	<5	<100	<1	<1	<1	1.9	<1	
		21.5	<5	<100	<1	<1	<1	5	<1	
287-SG-02	01/07/99	12	12	1500	<1	43	<1	12.0	15	
287-SG-02-DUP		12	20	1300	<1	39	<1	9.2	7.6	
287-SG-02-SPL		12	<0.1	NA	0.081 J	0.056 J	0.77	2.5	0.18	
287-SG-02		21.5	11	1200	<1	27	<1	3.7	<4.8	
		36	<5	<100	<1	4.4	<1	<1	<1	
287-SG-03	01/07/99	10	<5	<100	<1	<1	<1	5.4	<1	
		20	<5	<100	<1	<1	<1	<1	<1	
287-SG-03-SPL		20	0.022 J	NA	0.0082 J	0.038	0.0073 J	0.032	0.011 J	(a)
287-SG-03		37	<5	<100	<1	<1	<1	<1	<1	

Table proofed by CLC.

Notes:

(a) Other analytes detected: Ethanol (0.034 ug/L)

All primary and field duplicate (-DUP) samples were analyzed on site by InterPhase, of Los Angeles, CA using EPA Method 8020 for MTBE and BTEX, and Modified EPA Method 8015 for TPHg.

Additional field duplicate samples (-SPL) were analyzed off site by Air Toxics, Ltd., Folsom, CA using EPA Method TO-14.

ft bgs = feet below ground surface

NA = Not analyzed

TPH = total petroleum hydrocarbons

ug/L = micrograms per liter

Data Qualifiers (if shown on table):

E = Exceeds the calibration range

I = Interference by the sample matrix

J = Estimated value

UJ = Not detected at the estimated reporting limit shown

Table 2
Summary of Chemical Analysis Results for Soil Samples - Site #287
Santa Clara Valley Water District

Location	Date Sampled	Depth (ft bgs)	Methyl Tertiary Butyl Ether (MTBE) ug/Kg	TPH as Gasoline (TPHg) mg/Kg	Benzene (B) ug/Kg	Toluene (T) ug/Kg	Ethyl Benzene (E) ug/Kg	meta/para-Xylenes (m/p-X) ug/Kg	ortho-Xylene (o-X) ug/Kg	Di-isopropyl Ether (DIPE) ug/Kg	Ethyl Tertiary Butyl Ether (ETBE) ug/Kg	Tertiary Amyl Methyl Ether (TAME) ug/Kg	Tertiary Butyl Alcohol (TBA) ug/Kg
287-BH-01	01/24/99	6.0-6.5	<5	49	25	10	450	1400	43	<20	<20	<20	<200
		18.5-19.0	<5	<1	<5	<5	<5	6.9	<5	<20	<20	<20	<200
287-BH-02	01/27/99	16.5-17.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		23.5-24.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		43.5-44.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
287-BH-03	01/27/99	6.0-6.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		10.5-11.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		19.0-19.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200

Table proofed by CLC.

Notes:

All samples were analyzed by Alpha Analytical, Inc. of Sparks, NV, using EPA Method 8260 for MTBE, BTEX, DIPE, ETBE, TAME, and TBA, and Modified EPA Method 8015 for TPHg.

ft bgs = feet below ground surface

mg/Kg = milligrams per kilogram

TPH = total petroleum hydrocarbons

ug/Kg = micrograms per kilogram

Data Qualifiers (if shown on table):

J = Estimated value

UJ =Not detected at the estimated reporting limit shown

Table 3
Summary of Chemical Analysis Results for Groundwater Samples - Site # 287
Santa Clara Valley Water District

Location	Date Sampled	Depth (ft bgs)	Methyl Tertiary Butyl Ether (MTBE) ug/L	TPH as Gasoline (TPHg) mg/L	Benzene (B) ug/L	Toluene (T) ug/L	Ethyl Benzene (E) ug/L	meta/para-Xylenes (m/p-X) ug/L	ortho-Xylene (o-X) ug/L	Di-isopropyl Ether (DIPE) ug/L	Ethyl Tertiary Butyl Ether (ETBE) ug/L	Tertiary Amyl Methyl Ether (TAME) ug/L	Tertiary Butyl Alcohol (TBA) ug/L
287-BH-01	01/26/99	91.0	<0.5	<0.05	1.5	2.2	0.53	2.2	1.1	<1	<1	<1	<10
287-BH-01-DUP		91.0	<0.5	<0.05	1.4	2.2	0.56	2.7	1.1	<1	<1	<1	<10
287-BH-02	01/27/99	86.0-91.0	800	<0.5	11	<2	<2	<2	<2	<4	<4	<4	<40

Table proofed by CLC.

Notes:

All primary and field duplicate (-DUP) samples were analyzed by Alpha Analytical, Inc. of Sparks, NV, using EPA Method 8260 for MTBE, BTEX, DIPE, ETBE, TAME, and TBA, and Modified EPA Method 8015 for TPHg.

ft bgs = feet below ground surface
mg/L = milligrams per liter
TPH = total petroleum hydrocarbons
ug/L = micrograms per liter

Data Qualifiers (if shown on table):

J = Estimated value
UJ =Not detected at the estimated reporting limit shown

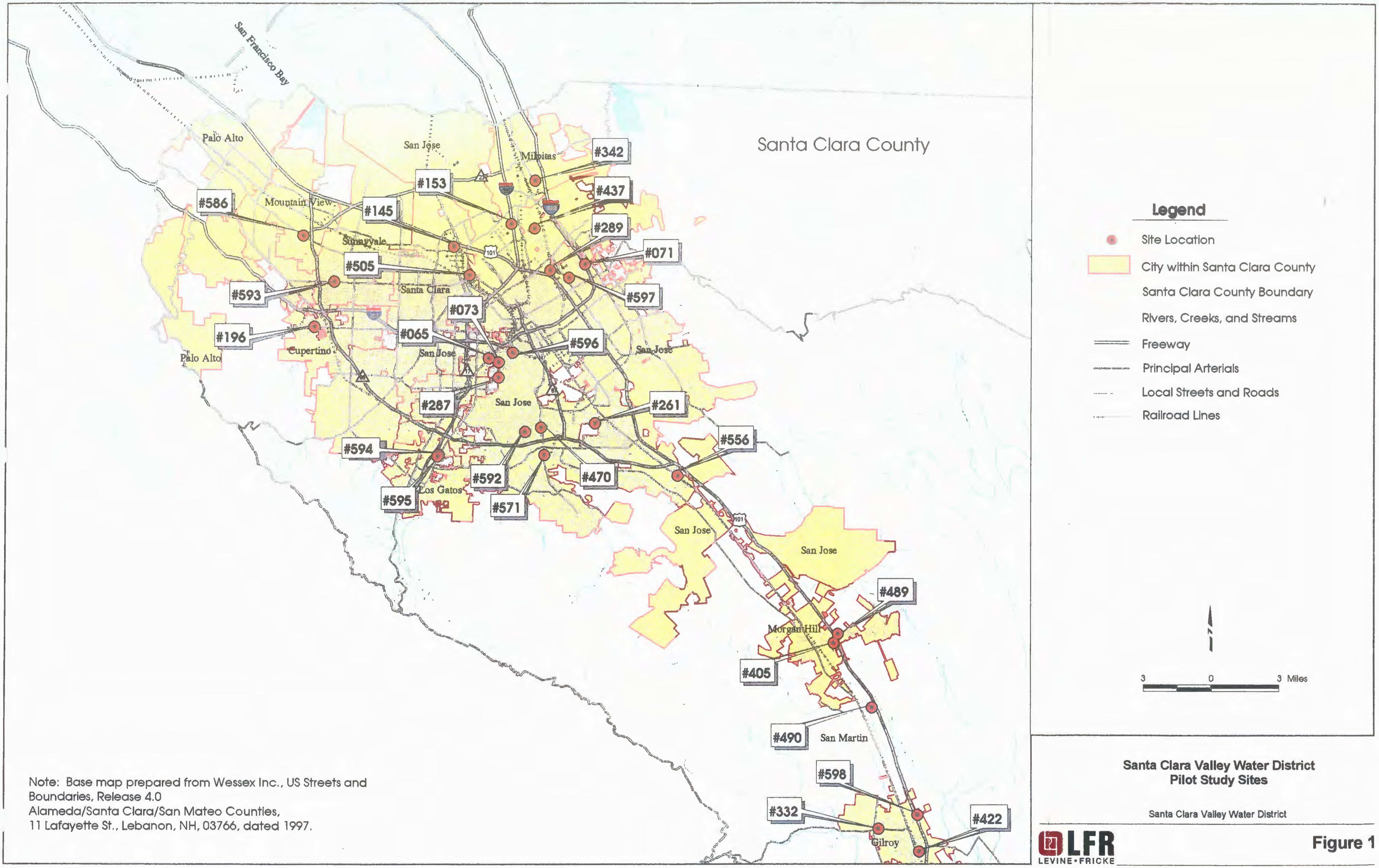
Table 4
Summary of Physical Parameters for Soil Samples - Site #287
Santa Clara Valley Water District

Location	Depth (ft bgs)	Visual Description	Total Organic Carbon (percent)	Moisture Content (percent)	Wet Weight (lbs/cu.ft.)	Dry Unit Weight (lbs/cu.ft.)	Porosity (percent)
287-BH-01	12.5 - 13.0	Lt. brown silty sand (SP-SM)	0.01	2.59	103.6	101.0	40.04
	21.5 - 22.0	Brown fine sandy silty clay	0.17	20.16	118.7	98.4	41.58
	24.5 - 25.0	Brown fine sandy clay	0.15	23.00	122.6	99.7	40.81
	44.5 - 45.0	Brown fine sandy silty clay	0.04	19.00	140.6	118.2	29.83

Table proofed by CLC.

Notes:

Specific gravity values were 2.70 for all samples analyzed.
Total organic carbon analyses were performed by Curtis and Tompkins Analytical Laboratories, Berkeley, CA.
All other analyses were performed by URS Greiner Woodward Clyde, Oakland, CA.
ft bgs = feet below ground surface
lbs/cu.ft. = pounds per cubic foot
NA = Not analyzed



Note: Base map prepared from Wessex Inc., US Streets and Boundaries, Release 4.0
Alameda/Santa Clara/San Mateo Counties,
11 Lafayette St., Lebanon, NH, 03766, dated 1997.

Santa Clara Valley Water District
Pilot Study Sites

Santa Clara Valley Water District

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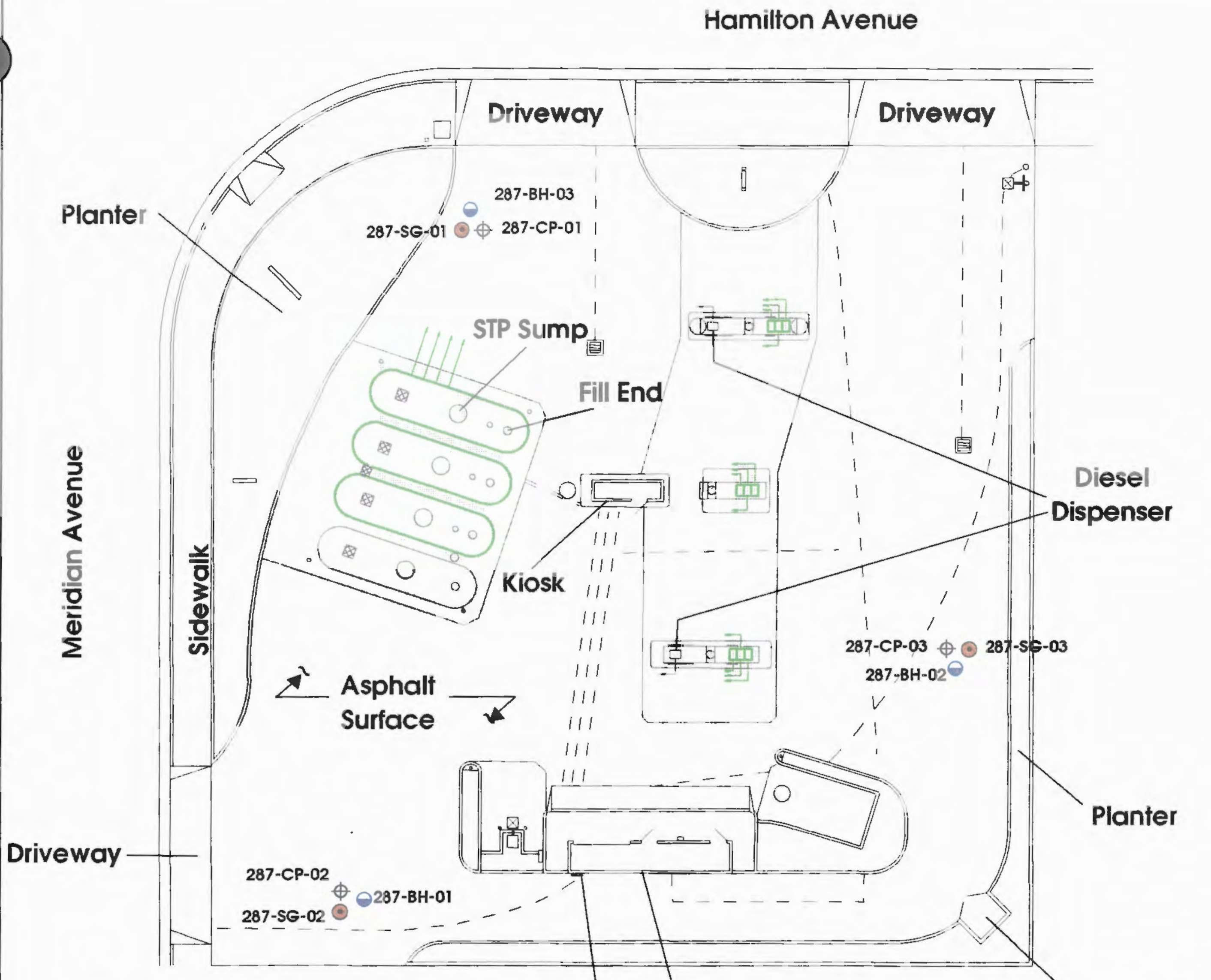
Figure 1



Legend

🟩 Gasoline underground storage tank, product and return piping, and dispenser. Piping locations were not provided in the drawing cited below.

○ ☒ UST access port

▭ Concrete slab

▤ Storm Drain Catch Basin

— — — Underground utilities

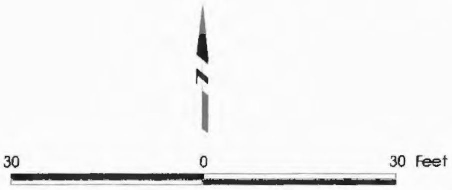
◒ Soil and groundwater sampling location

● Soil-gas sampling location

⊕ Cone-penetrometer test location

STP - Submersible Turbine Pump

Note: Base map prepared from Proposed Site Plan, Drawing # P-1, 1610 Meridian Road & Hamilton Avenue, San Jose, CA, by A&S Engineering, of Walnut Creek, CA, Dated 11/16/94.



Site #287

Site Plan

Santa Clara Valley Water District

LFR
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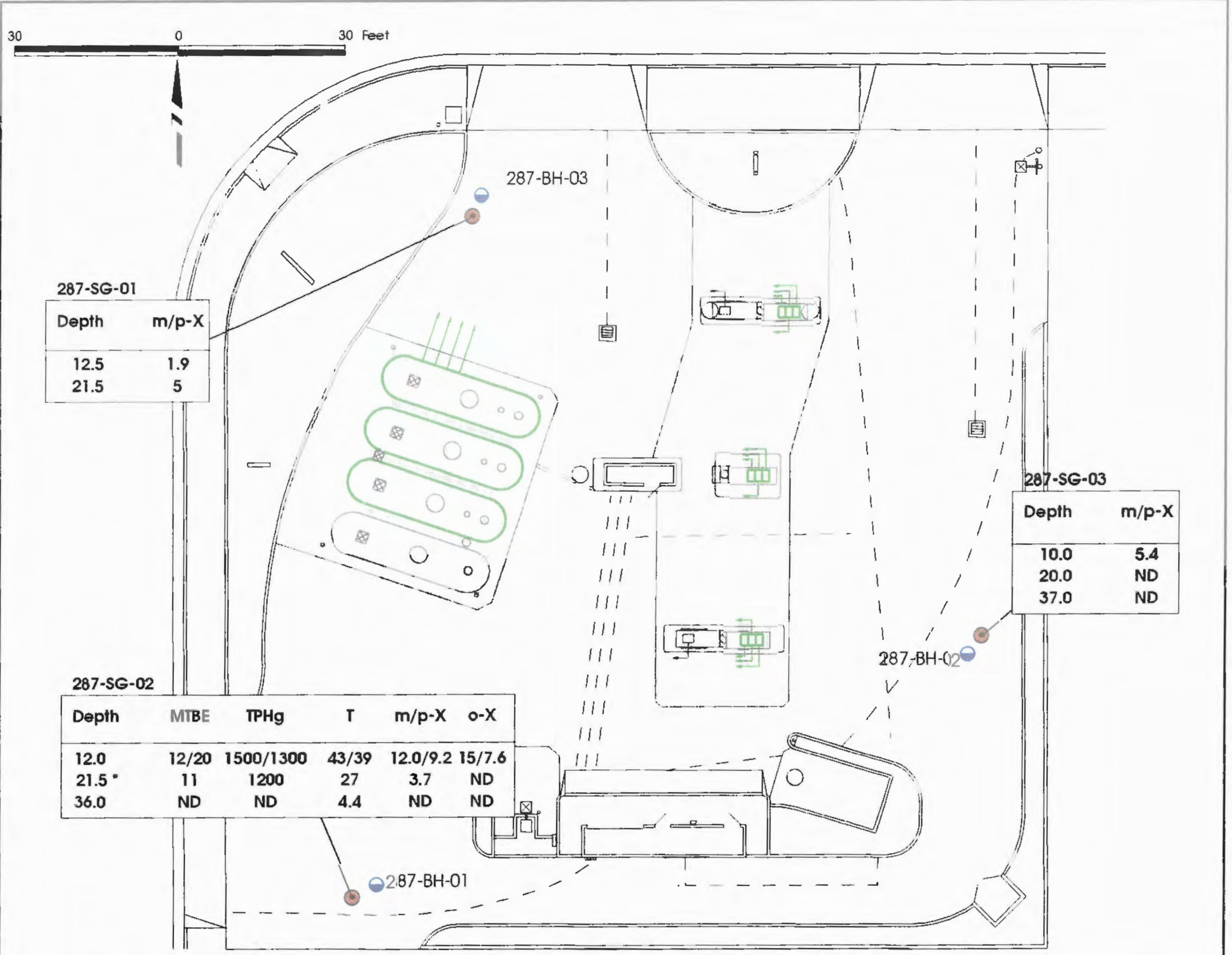
Figure 2



287-SG-01

Depth	m/p-X
12.5	1.9
21.5	5

287-SG-02

Depth	MTBE	TPHg	T	m/p-X	o-X
12.0	12/20	1500/1300	43/39	12.0/9.2	15/7.6
21.5 *	11	1200	27	3.7	ND
36.0	ND	ND	4.4	ND	ND

287-SG-03

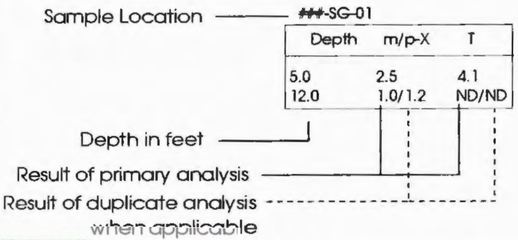
Depth	m/p-X
10.0	5.4
20.0	ND
37.0	ND

Legend

● Soil-gas sampling location

◒ Soil and groundwater sampling location

The following represents a hypothetical sampling point and defines the characters associated with that point:


Sample Location
###-SG-01
Depth in feet
Result of primary analysis
Result of duplicate analysis when applicable

Depth	m/p-X	T
5.0	2.5	4.1
12.0	1.0/1.2	ND/ND

🟩 Gasoline underground storage tank, product and return piping, and dispenser

○ ☒ UST access port

▭ Concrete slab

▤ Storm Drain Catch Basin

— — — · Underground utilities

See Figure 2 for description of site features and origin of base map.

Notes

Concentrations of analytes detected are presented; analytes not detected are not presented or are presented as ND (not detected). MTBE and BTEX were analyzed using EPA Method 8020 and TPHg was analyzed using Modified EPA Method 8015.

Results in micrograms/liter (ug/L)
RL = Reporting Limit

* Indicates elevated RL (see results table for reporting limits)

Each sample was analyzed for the following:

MTBE = Methyl Tertiary Butyl Ether (RL = 5 ug/L)
TPHg = Total Petroleum Hydrocarbons as Gasoline (RL = 100 ug/L)
B = Benzene (RL = 1 ug/L)
T = Toluene (RL = 1 ug/L)
E = Ethyl Benzene (RL = 1 ug/L)
m/p-X = meta/para-Xylenes (RL = 1 ug/L)
o-X = ortho-Xylene (RL = 1 ug/L)

Site #287

Summary of Chemical Analysis Results for Soil-Gas Samples

Santa Clara Valley Water District

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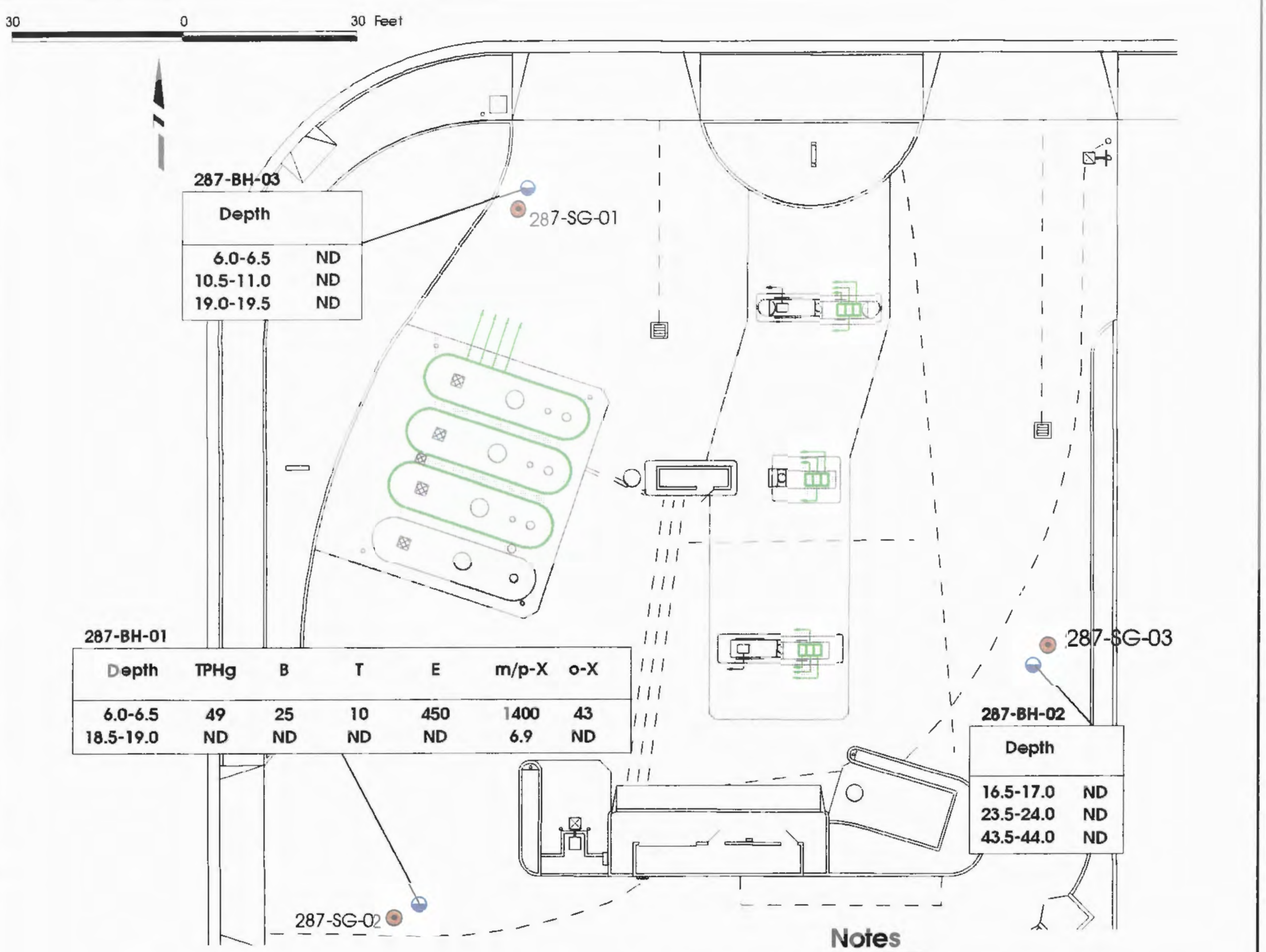
Figure 3



287-BH-03

Depth	
6.0-6.5	ND
10.5-11.0	ND
19.0-19.5	ND

287-BH-01

Depth	TPHg	B	T	E	m/p-X	o-X
6.0-6.5	49	25	10	450	1400	43
18.5-19.0	ND	ND	ND	ND	6.9	ND

287-BH-02

Depth	
16.5-17.0	ND
23.5-24.0	ND
43.5-44.0	ND

Legend

◒ Soil and groundwater sampling location

◉ Soil-gas sampling location

The following represents a hypothetical sampling point and defines the characters associated with that point:

Sample Location — ###-BH-01

Depth	m/p-X	T
5.5-6.0	6.2	7.5
12.0-12.5	5.1/5.3	ND/ND

Depth in feet

Result of primary analysis

Result of duplicate analysis when applicable

🟩 Gasoline underground storage tank, product and return piping, and dispenser

○ ☒ UST access port

☐ Concrete slab

▤ Storm Drain Catch Basin

— — — Underground utilities

See Figure 2 for description of site features and origin of base map.

Notes

Concentrations of analytes detected are presented; analytes not detected are not presented or are presented as ND (not detected). TPHg was analyzed using Modified EPA Method 8015, all other analytes were analyzed using EPA Method 8260.

Results in micrograms/kilogram (ug/Kg) for all compounds except TPHg which is presented in milligrams/kilogram (mg/Kg).

RL = Reporting Limit

Each sample was analyzed for the following:

MTBE = Methyl Tertiary Butyl Ether (RL = 5 ug/Kg)
TPHg = Total Petroleum Hydrocarbons as Gasoline (RL = 1 mg/Kg)
B = Benzene (RL = 5 ug/Kg)
T = Toluene (RL = 5 ug/Kg)
E = Ethyl Benzene (RL = 5 ug/Kg)
m/p-X = meta/para-Xylenes (RL = 5 ug/Kg)
o-X = ortho-Xylene (RL = 5 ug/Kg)
DIPE = Di-isopropyl Ether (RL = 20 ug/Kg)
ETBE = Ethyl Tertiary Butyl Ether (RL = 20 ug/Kg)
TAME = Tertiary Amyl Methyl Ether (RL = 20 ug/Kg)
TBA = Tertiary Butyl Alcohol (RL = 200 ug/Kg)

Site #287

Summary of Chemical Analysis Results for Soil Samples

Santa Clara Valley Water District

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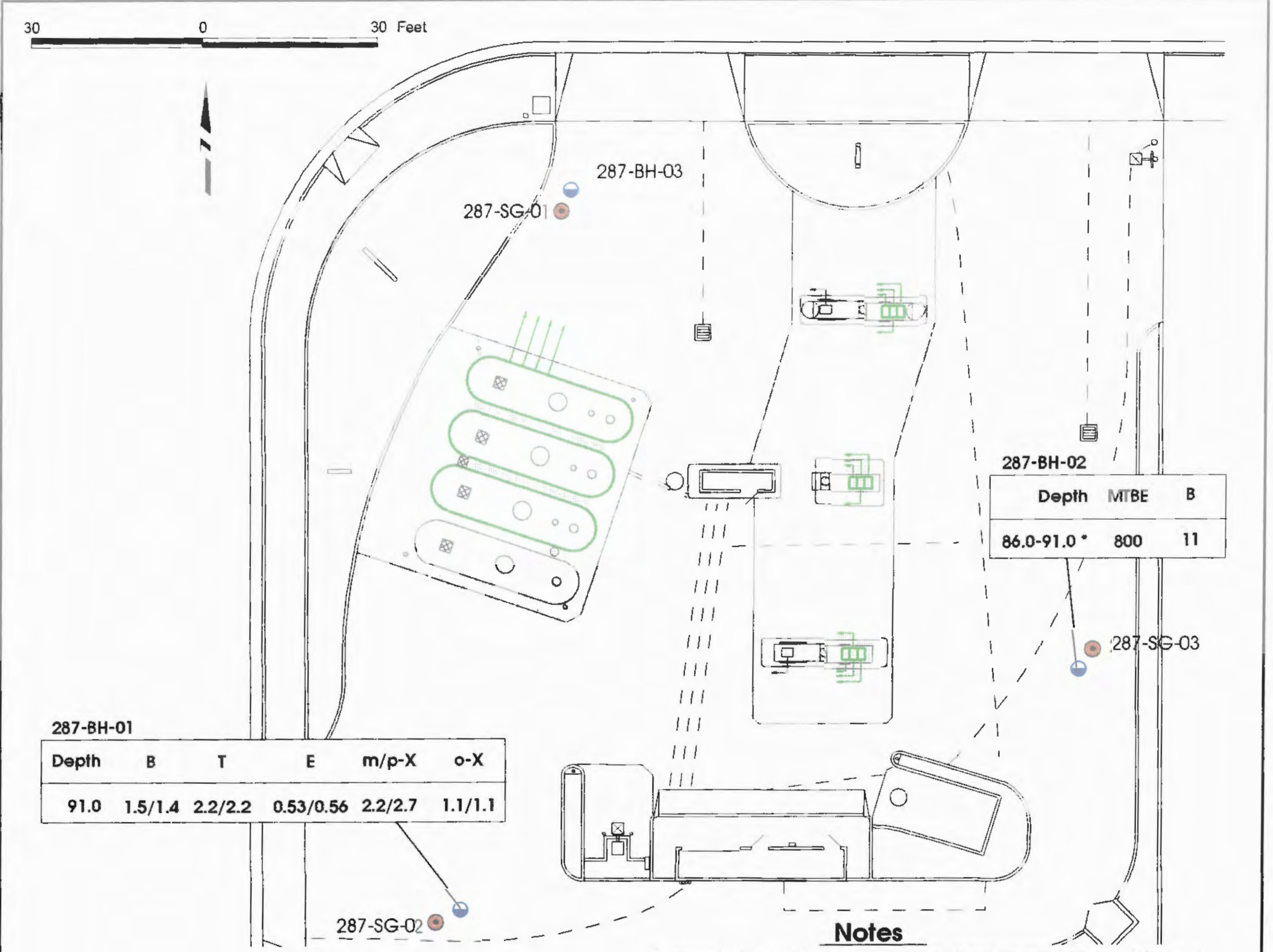
Figure 4



287-BH-02

Depth	MTBE	B
86.0-91.0 *	800	11

287-BH-01

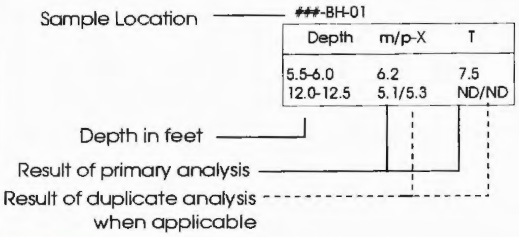
Depth	B	T	E	m/p-X	o-X
91.0	1.5/1.4	2.2/2.2	0.53/0.56	2.2/2.7	1.1/1.1

Legend

◒ Soil and groundwater sampling location

● Soil-gas sampling location

The following represents a hypothetical sampling point and defines the characters associated with that point:


Sample Location
###-BH-01
Depth in feet
Result of primary analysis
Result of duplicate analysis when applicable

Depth	m/p-X	T
5.5-6.0	6.2	7.5
12.0-12.5	5.1/5.3	ND/ND

🟩 Gasoline underground storage tank, product and return piping, and dispenser

○ ☒ UST access port

☐ Concrete slab

▤ Storm Drain Catch Basin

– – – Underground utilities

See Figure 2 for description of site features and origin of base map.

Notes

Concentrations of analytes detected are presented; analytes not detected are not presented or are presented as ND (not detected). TPHg was analyzed using Modified EPA Method 8015, all other analytes were analyzed using EPA Method 8260.

Results in micrograms/liter (ug/L) for all compounds except TPHg which is presented in milligrams/liter (mg/L).

RL = Reporting Limit

* Indicates elevated RL (see results table for reporting limits)

Each sample was analyzed for the following:

MTBE = Methyl Tertiary Butyl Ether (RL = 0.5 ug/L)
TPHg = Total Petroleum Hydrocarbons as Gasoline (RL = 0.05 mg/L)
B = Benzene (RL = 0.5 ug/L)
T = Toluene (RL = 0.5 ug/L)
E = Ethyl Benzene (RL = 0.5 ug/L)
m/p-X = meta/para-Xylenes (RL = 0.5 ug/L)
o-X = ortho-Xylene (RL = 0.5 ug/L)
DIPE = Di-isopropyl Ether (RL = 1 ug/L)
ETBE = Ethyl Tertiary Butyl Ether (RL = 1 ug/L)
TAME = Tertiary Amyl Methyl Ether (RL = 1 ug/L)
TBA = Tertiary Butyl Alcohol (RL = 10 ug/L)

Site #287

Summary of Chemical Analysis Results for Groundwater Samples

Santa Clara Valley Water District

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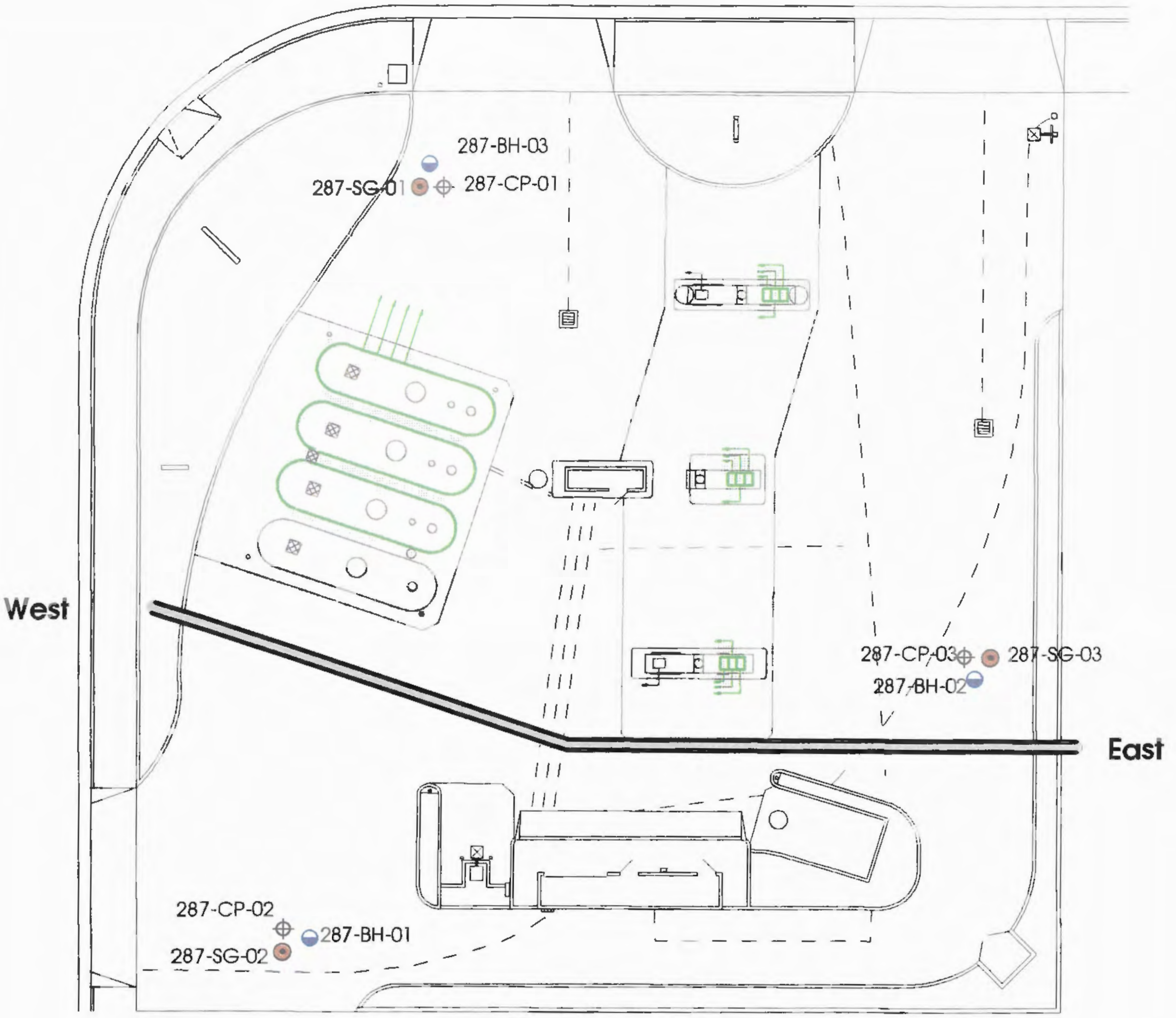
Figure 5



Legend

🟩 Gasoline underground storage tank, product and return piping, and dispenser. Piping locations were not provided in the drawing cited below.

○ ☒ UST access port

☐ Concrete slab

▤ Storm Drain Catch Basin

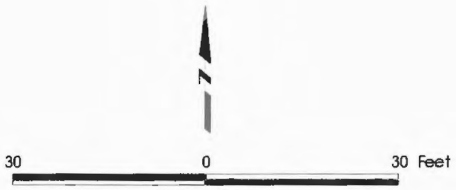
— — — · Underground utilities

◒ Soil and groundwater sampling location

● Soil-gas sampling location

⌖ Cone-penetrometer test location

See Figure 2 for description of site features and origin of base map.



Site #287

Site Plan Showing Orientation of Vertical Profile

Santa Clara Valley Water District

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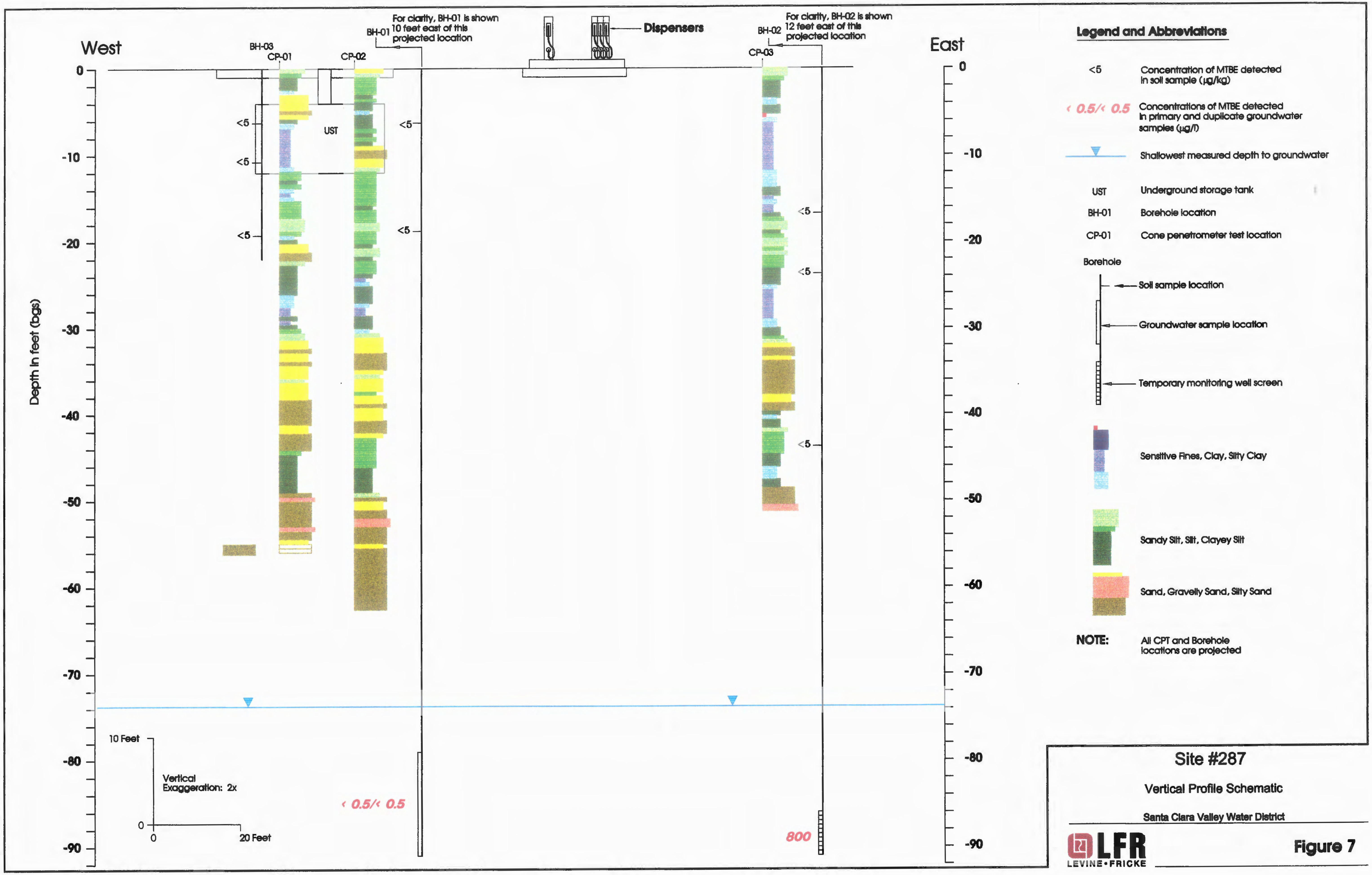
Figure 6


West
East
Depth in feet (bgs)
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
BH-03
CP-01
CP-02
BH-01
For clarity, BH-01 is shown 10 feet east of this projected location
Dispensers
BH-02
For clarity, BH-02 is shown 12 feet east of this projected location
CP-03
UST
<5
<5
<5
<5
<5
<5
<5
<5
‹ 0.5/‹ 0.5
800
10 Feet
0
0
20 Feet
Vertical Exaggeration: 2x
Legend and Abbreviations
<5
Concentration of MTBE detected in soil sample (µg/kg)
‹ 0.5/‹ 0.5
Concentrations of MTBE detected in primary and duplicate groundwater samples (µg/l)
Shallowest measured depth to groundwater
UST
Underground storage tank
BH-01
Borehole location
CP-01
Cone penetrometer test location
Borehole
Soil sample location
Groundwater sample location
Temporary monitoring well screen
Sensitive Fines, Clay, Silty Clay
Sandy Silt, Silt, Clayey Silt
Sand, Gravelly Sand, Silty Sand
NOTE:
All CPT and Borehole locations are projected

Site #287

Vertical Profile Schematic

Santa Clara Valley Water District

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Figure 7

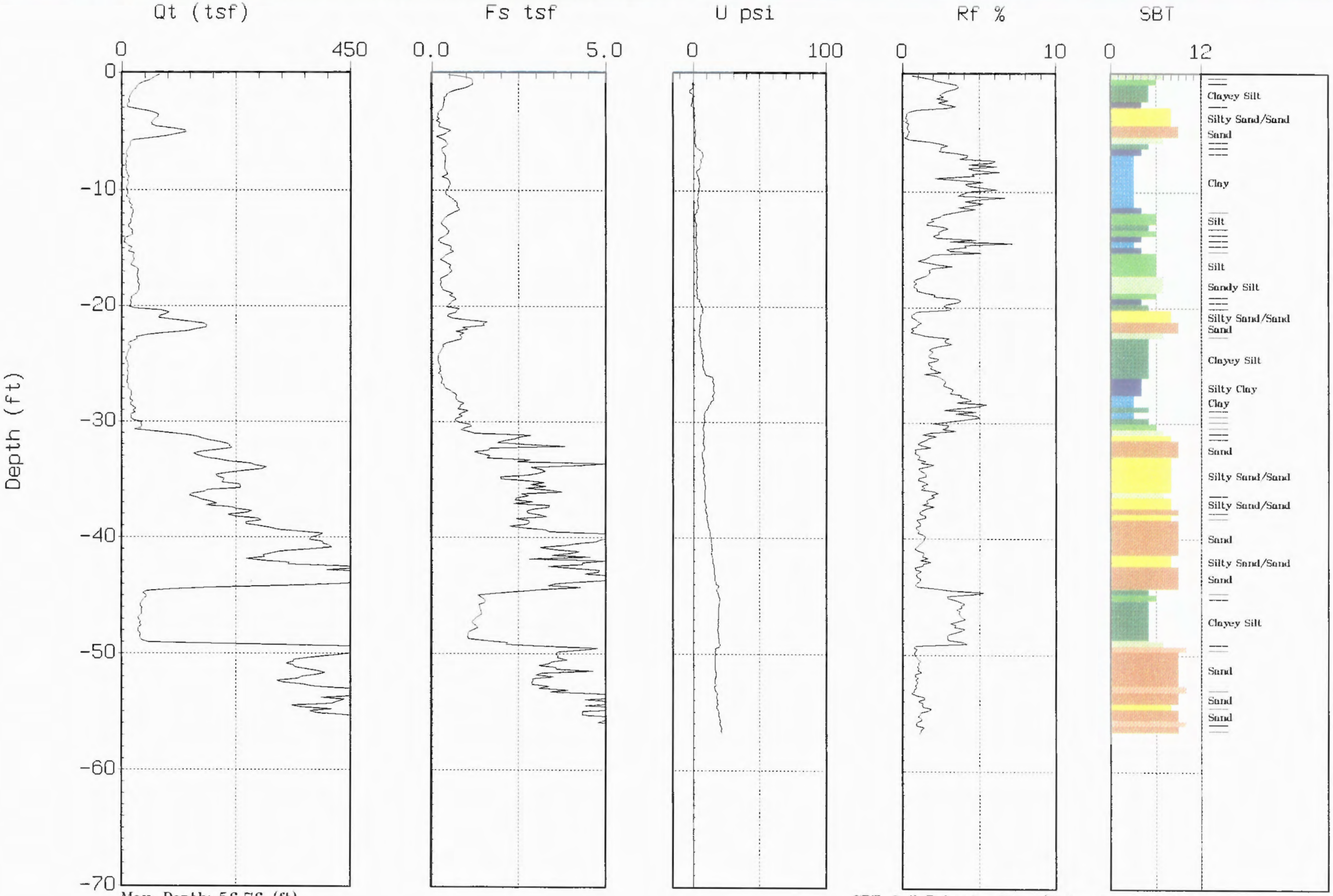
J:\ENGCAD\6730\CM#287.DWG 02/21/99 CM#505.PCP

GREGG

LFR LEVINE.FRICKE

Site: 287 SHELL OIL
Location : 287-CP-01

Geologist: T. BENNETT
Date : 12:29:98 17:15



Max. Depth: 56.76 (ft)

Depth Inc.: 0.164 (ft)

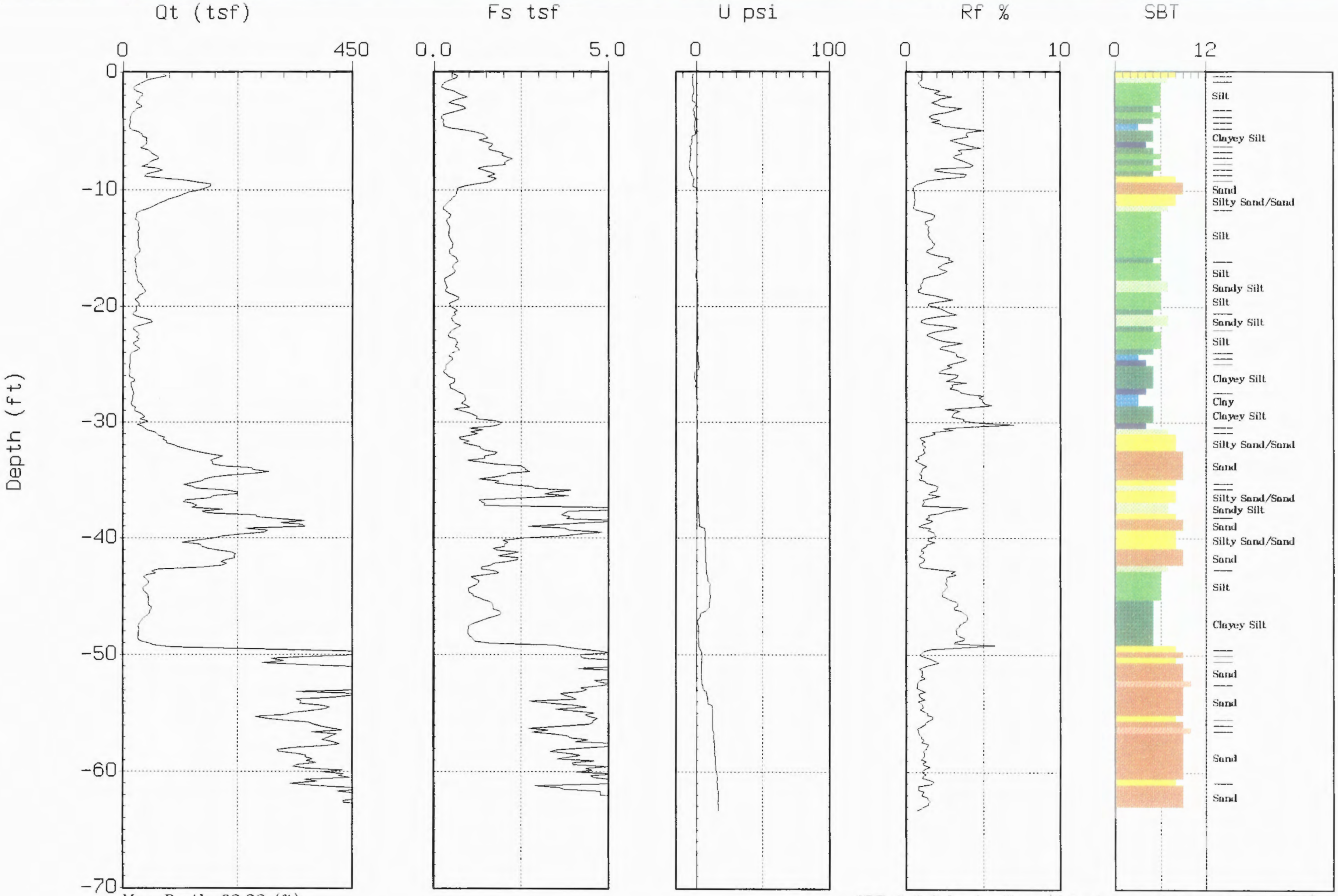
SBT: Soil Behavior Type (Robertson and Campanella 1988)

GREGG

LFR LEVINE.FRICKE

Site: 287 SHELL OIL
Location : 287-CP-02

Geologist: T. BENNETT
Date : 12:29:98 17:59



Max. Depth: 63.32 (ft)

Depth Inc.: 0.164 (ft)

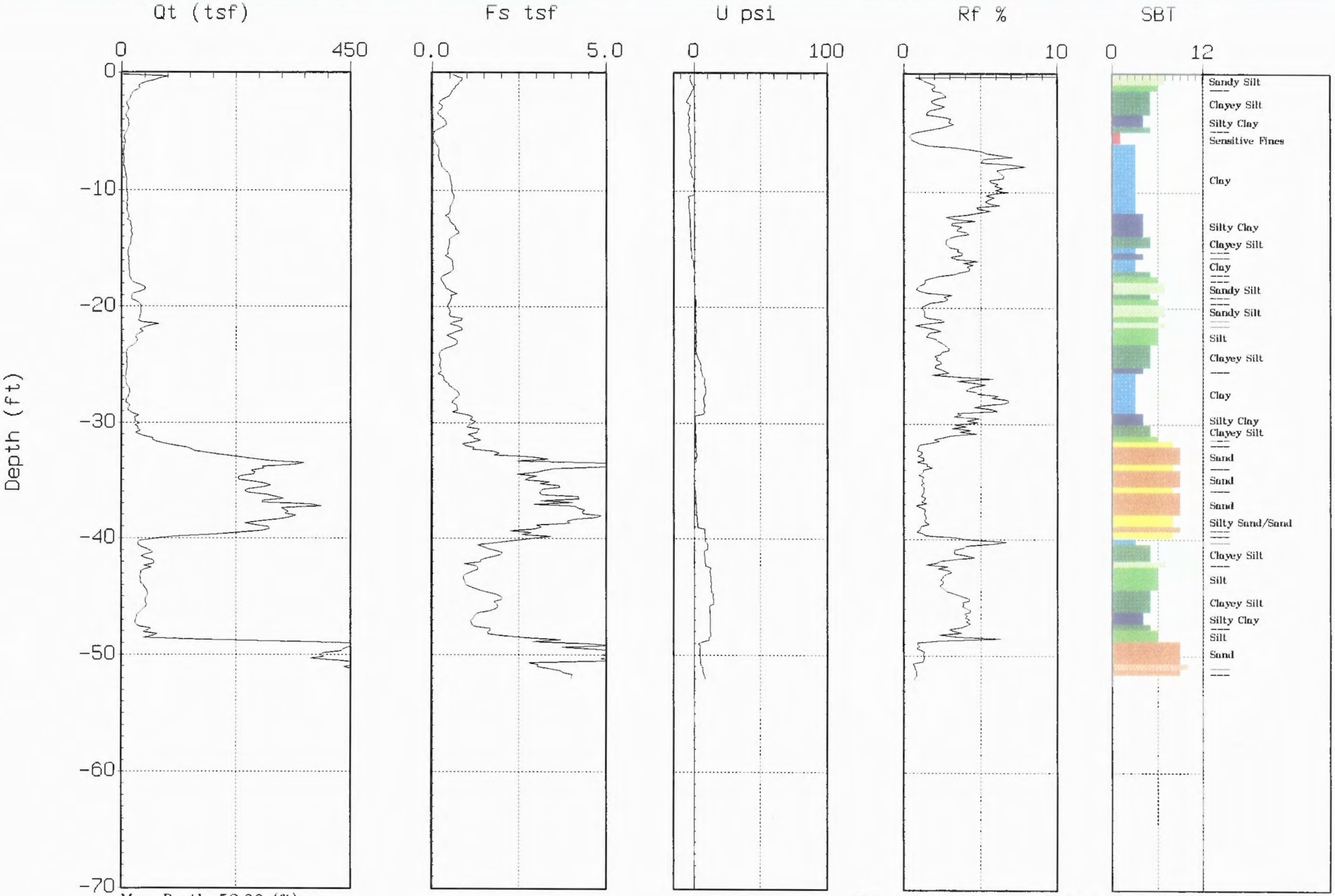
SBT: Soil Behavior Type (Robertson and Campanella 1988)

GREGG

LFR LEVINE.FRICKE

Site: 287 SHELL OIL
Location : 287-CP-03

Geologist: T. BENNETT
Date : 12:29:98 18:59



Max. Depth: 52.00 (ft)

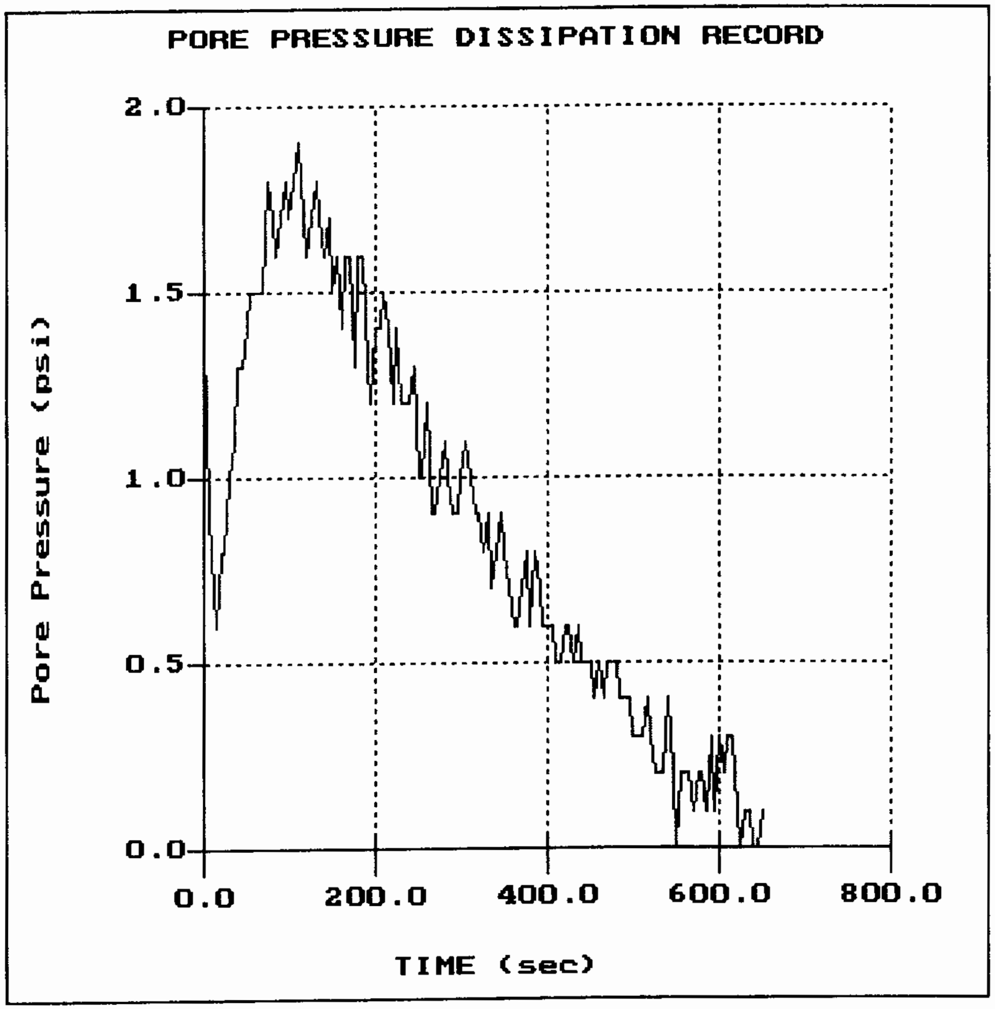
Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson and Campanella 1988)

LFR LEVINE FRICKE

Hole:287-CP-02
Location:287 SHELL OIL

Cone:20 TON AD071
Date:12:29:98 17:59



File: 14528702.PPR
Depth (m): 10.20
(ft): 33.46
Duration : 650.0s
U-min: 0.00 645.0s
U-max: 1.90 110.0s

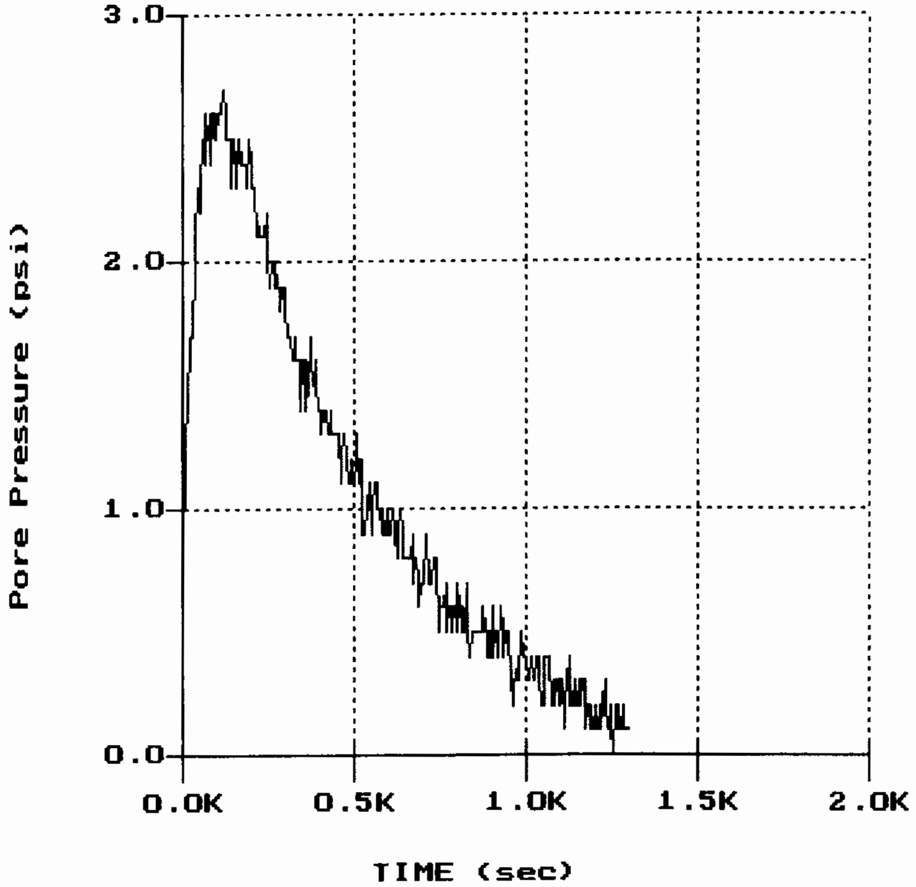
LFR LEVINE FRICKE

Hole:287-CP-03
Location:287 SHELL OIL

Cone:20 TON AD071
Date:12:29:98 18:59

File: 14528703.PPR
Depth (m): 10.15
(ft): 33.30
Duration : 1300.0s
U-min: 0.00 1255.0s
U-max: 2.70 120.0s

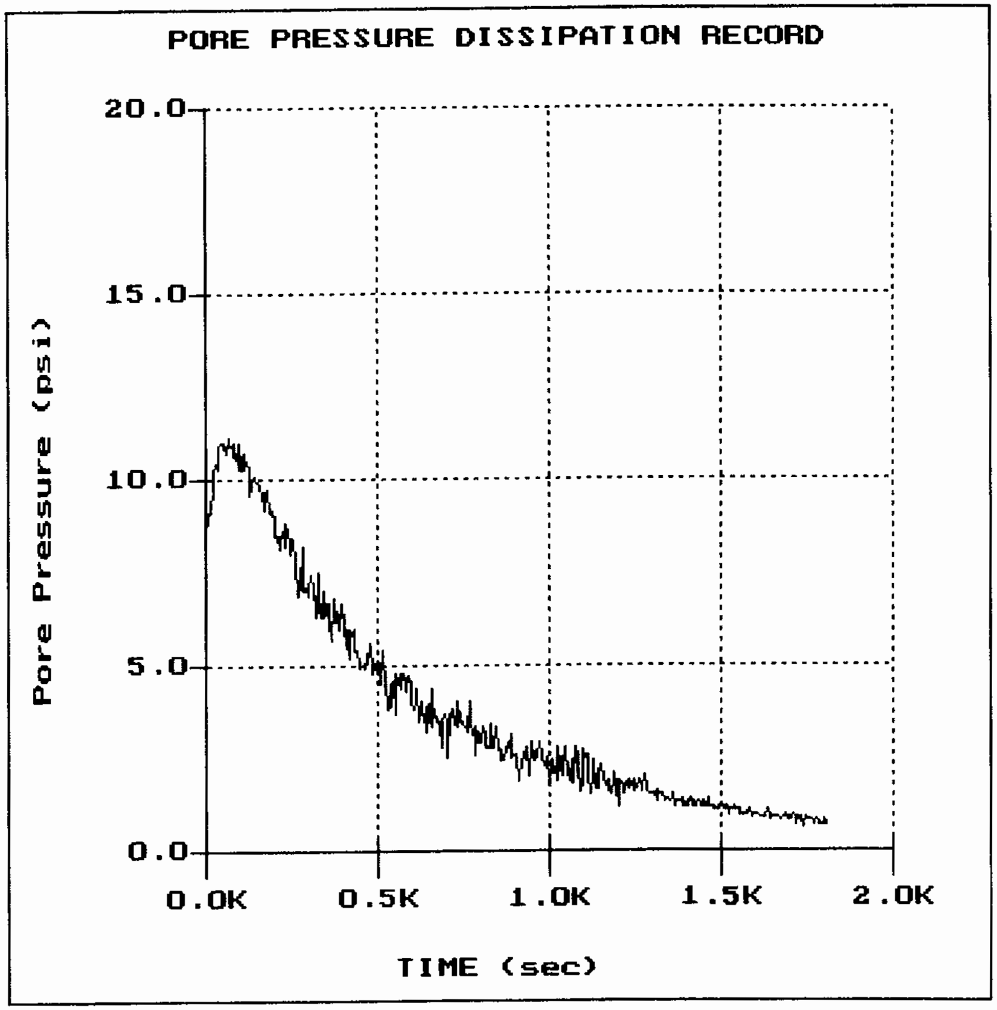
PORE PRESSURE DISSIPATION RECORD



LFR LEVINE FRICKE

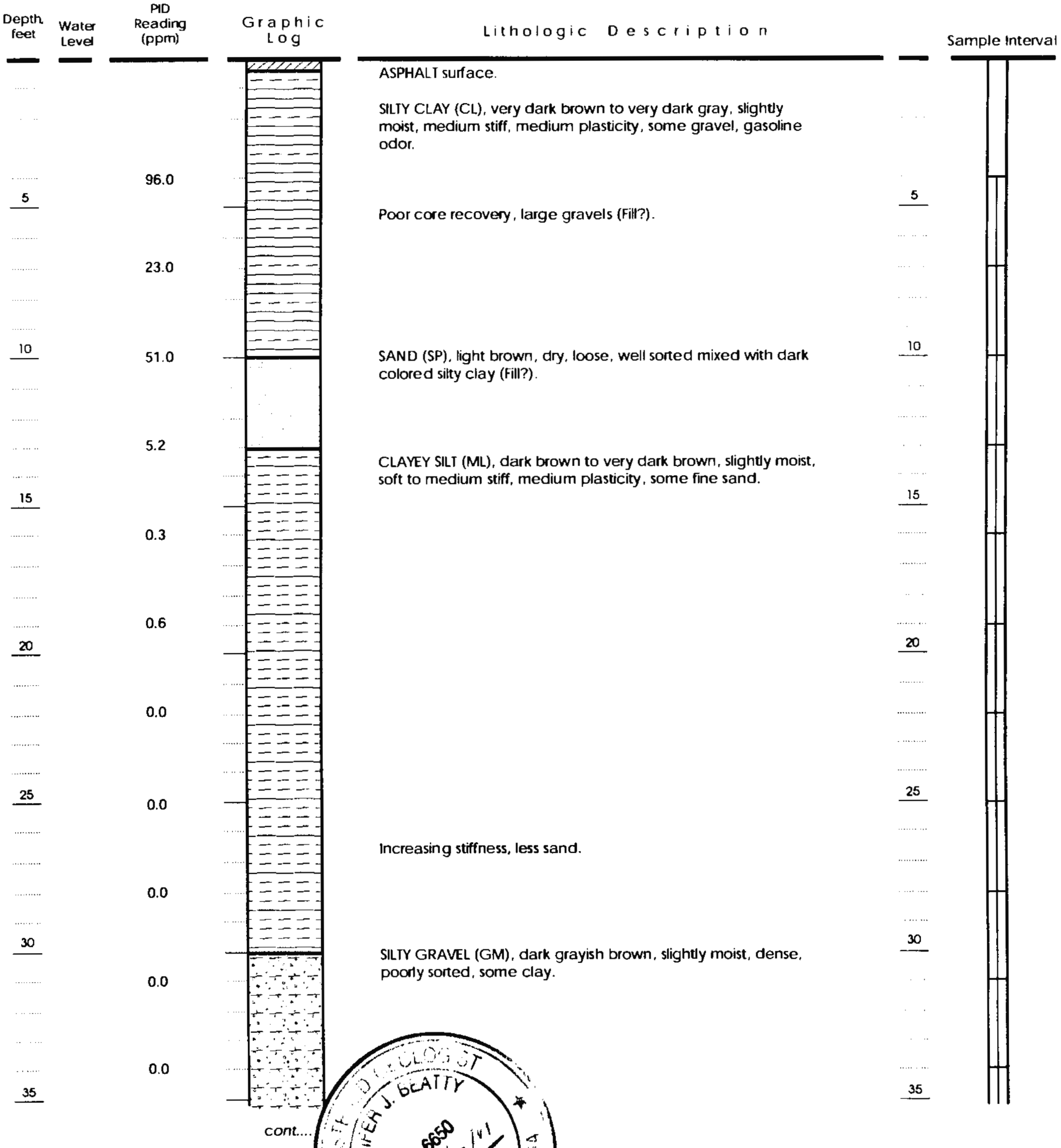
Hole:287-CP-03
Location:287 SHELL OIL

Cone:20 TON AD071
Date:12:29:98 18:5


PORE PRESSURE DISSIPATION RECORD

File: 14528703.PPR
Depth (m): 15.85
(ft): 52.00
Duration : 1805.0s
U-min: 0.60 1740.0s
U-max: 11.10 65.0s

SCVWD PILOT STUDY



PID Reading (ppm)
96.0
23.0
51.0
5.2
0.3
0.6
0.0
0.0
0.0
0.0
0.0

Lithologic Description

ASPHALT surface.

SILTY CLAY (CL), very dark brown to very dark gray, slightly moist, medium stiff, medium plasticity, some gravel, gasoline odor.

Poor core recovery, large gravels (Fill?).

SAND (SP), light brown, dry, loose, well sorted mixed with dark colored silty clay (Fill?).

CLAYEY SILT (ML), dark brown to very dark brown, slightly moist, soft to medium stiff, medium plasticity, some fine sand.

Increasing stiffness, less sand.

SILTY GRAVEL (GM), dark grayish brown, slightly moist, dense, poorly sorted, some clay.

JENIFER J. BEATTY
No. 6650
Exp. 4/30/01

Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: January 24-25, 1999
LFR Geologist: Thomas Zakaria, R.G., CH.G.

EXPLANATION

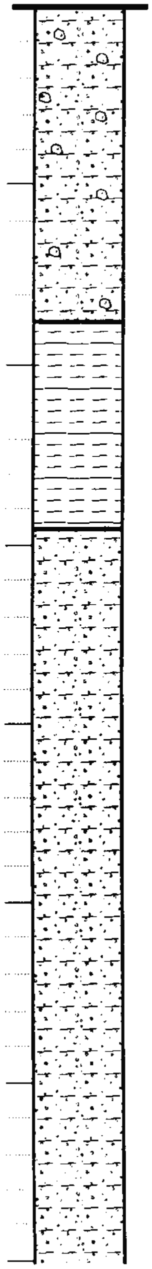
☰	Clay
┅	Silt
⬚	Sand
⁘	Gravel

PID - Photoionization Detector

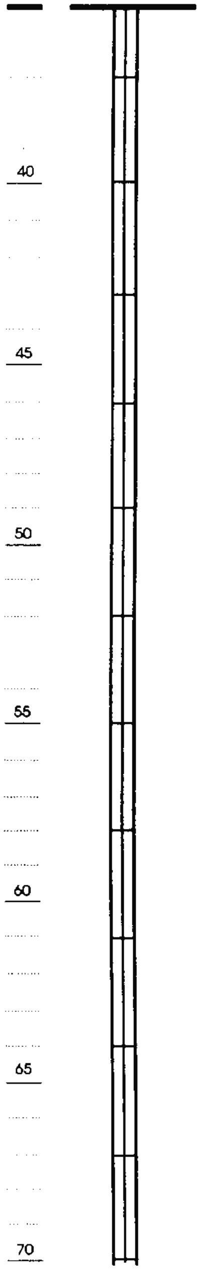
▼ Water level at time of drilling

Depth, feet	Water Level	PID Reading (ppm)	Lithologic Description
			Increasing clay content, very dense, dry, large gravels.
		0.0	
40		0.0	
		0.0	
45			CLAYEY SILT (ML-CL), brown, slightly moist to moist, stiff, medium plasticity, massive, some fine sand.
		0.0	
		0.0	Increased sand content.
50			SILTY GRAVEL (GM), brown to grayish brown, dry to slightly moist, dense, some clay.
		0.0	
55		0.0	
		0.0	
60			
		0.0	
		0.0	
65			
		0.0	
70		0.0	

Graphic Log



Sample Interval



No. 6650
Exp 4/3/01

Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: January 24-25, 1999
LFR Geologist: Thomas Zakaria, R.G., CH.G.

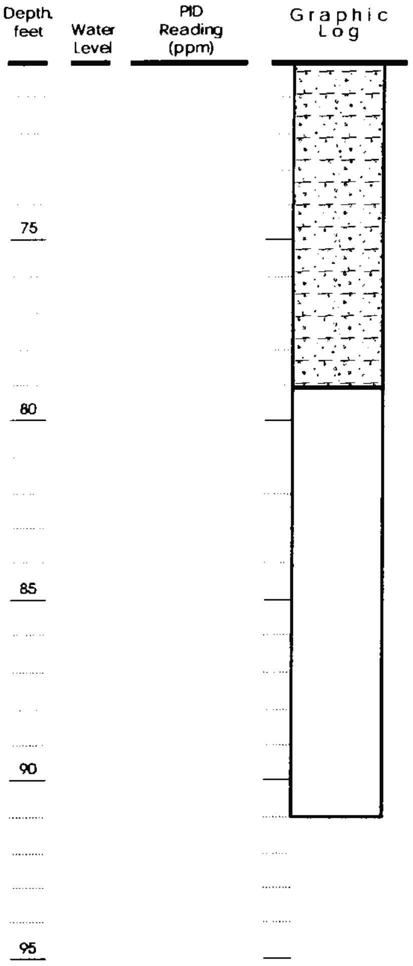
EXPLANATION

▤ Clay
▤ Silt
▨ Sand
▨ Gravel

PID - Photoionization Detector

▼ Water level at time of drilling

SCVWD PILOT STUDY



Lithologic Description

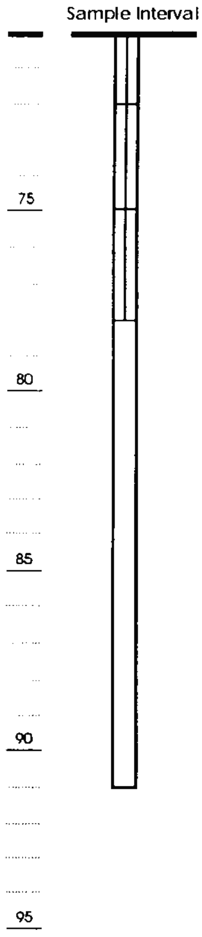
SILTY GRAVEL (GM), grayish brown, slightly moist, some clay, sandy interbeds (1" to 2" thick).

(Note: Different boring advanced approximately 8 inches away for lithology below 73 feet.)

Between 79 to 81 feet drive 1-inch diameter rod, no sampling.

BOTTOM OF BORING AT 91 FEET.

(Note: Location for this boring is approximately 18 inches from BH-01; not logged between 0 and 70 feet.)



65 65

70 70

J. BEATTY
No. 6650
Exp. 4/30/01
STATE OF CALIFORNIA

Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: January 24-25, 1999
LFR Geologist: Thomas Zakaria, R.G., CH.G.

EXPLANATION

☰	Clay
▤	Silt
░	Sand
▨	Gravel

PID - Photoionization Detector

▼ Water level at time of drilling

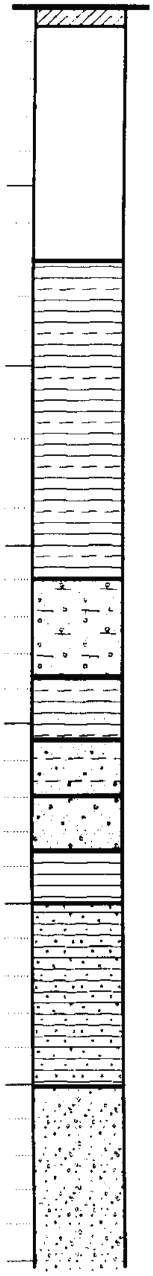
LFR
LEVINE•FRICKE

LITHOLOGY FOR 287-BH-01 *(page 3 of 3)*

Project No. 6730.00-024

SCVWD PILOT STUDY

Depth, feet	Water Level	PID Reading (ppm)	Graphic Log	Lithologic Description	Sample Interval
				ASPHALT surface.	
5				No recovery from 5 to 7 feet.	
		0.0		SILTY CLAY (CL), grayish brown, moist, very stiff, medium plasticity, trace coarse sand.	
10		0.0		Low plasticity.	
		0.0		Stiff, low plasticity, increased silt.	
15				SILTY GRAVELLY SAND (SM), grayish brown, slightly moist, medium dense, gap graded, fine sand, rounded gravel less than 1 centimeter.	
				SANDY SILTY CLAY (CL), mottled brown, yellowish brown, and gray, slightly moist, soft, low plasticity, very fine sand.	
20		0.0		GRAVELLY SILTY SAND (SM), grayish brown, moist, medium dense, fine grained, subround, gravel less than 1 centimeter. GRAVELLY SAND (SW), grayish brown, moist, loose, less than 1 centimeter, predominantly fine to medium grained.	
		0.0		Grades into CLAY (CL), grayish brown, moist, very soft, low to medium plasticity.	
25		0.0		GRAVELLY CLAY (CL), grayish brown, moist, very soft, medium plasticity.	
				Very moist, highly weathered sandstone and siltstone, clasts, wet in places.	
30		0.0		SANDY GRAVEL (GW), brownish gray, slightly moist, very dense, well graded, angular to 2 centimeters, poor recovery.	
		0.0			
35					



cont....

Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: January 27, 1999
LFR Geologist: Todd Miller, R.G., CH.G.

No. 6650
Exp.

EXPLANATION

▤	Clay
☷	Silt
⁘	Sand
⁙	Gravel

PID - Photoionization Detector

▼ Water level at time of drilling

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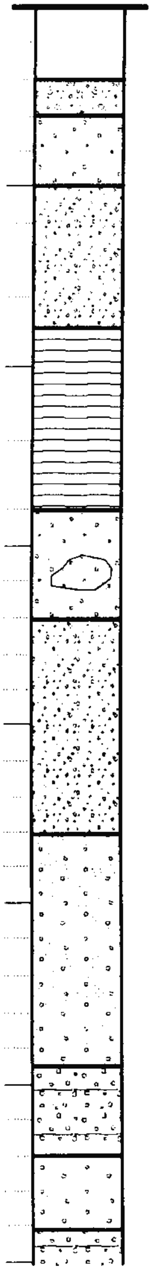
LITHOLOGY FOR 287-BH-02 *(page 1 of 3)*

Project No. 6730.00-024

SCVWD PILOT STUDY



Depth, feet	Water Level	PID Reading (ppm)	Lithologic Description
			No recovery from 35 to 37 feet.
			Weathered GRAVEL, dark brown and brownish gray, moist, very dense.
		0.0	GRAVELLY SAND (SP), grayish brown, very moist, medium dense, medium-grained sand, gravel less than 1 centimeter, angular.
40			
		0.0	SANDY GRAVEL (GW), brownish gray, slightly moist, very dense, well graded angular clasts to 3 centimeters, heterogenous, weathered.
		0.0	CLAY (CL), yellowish brown, slightly moist, medium stiff to soft, low plasticity, highly uniform.
45			
		0.0	Moist, soft, medium plasticity.
		0.0	GRAVELLY SAND (SW), grayish brown, moist, dense, well graded, gravel clasts up to 4 centimeters.
50			
			Siltstone cobble.
		0.0	SANDY GRAVEL (GW), dark brown to grayish brown, very moist, dense, well graded, angular gravel to 3 centimeters, trace silt.
55			
		0.0	Slightly moist, heterogenous weathered gravels.
		0.0	GRAVELLY SAND (SW), dark yellowish brown, very moist, medium dense, well graded, predominantly coarse, subangular grained.
60			
		0.0	
65			CLAYEY SANDY GRAVEL (GC), light yellowish brown, very moist, dense, well graded, angular and subangular to 3 centimeters.
			GRAVELLY SAND (SP), grayish brown, mediium dense, very moist to wet.
			CLAYEY SANDY GRAVEL (GC), dark grayish brown, slightly moist, very dense, coarse subangular gravel to 2.5 centimeters, coarse sand.
70			

Sample Interval

Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: January 27, 1999
LFR Geologist: Todd Miller, R.G., CH.G.

No. 6650
Exp. 4/3/01

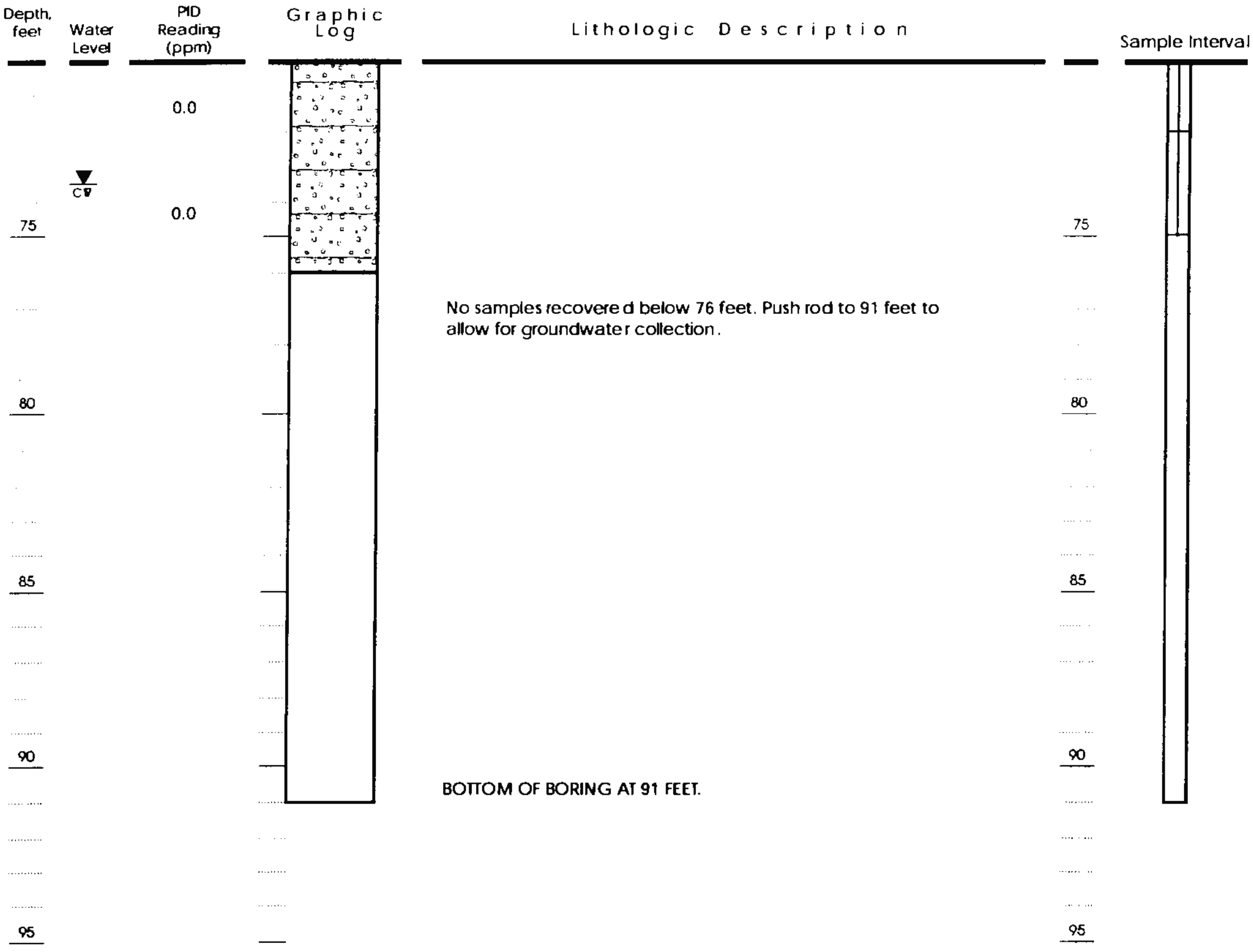
EXPLANATION

- ▤ Clay
- ▭ Silt
- ░ Sand
- ▒ Gravel

PID - Photoionization Detector

▼ Water level at time of drilling

SCVWD PILOT STUDY



No samples recovered below 76 feet. Push rod to 91 feet to allow for groundwater collection.

BOTTOM OF BORING AT 91 FEET.

No. 6650
Exp. 4/30/01

Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: January 27, 1999
LFR Geologist: Todd Miller, R.G., CH.G.

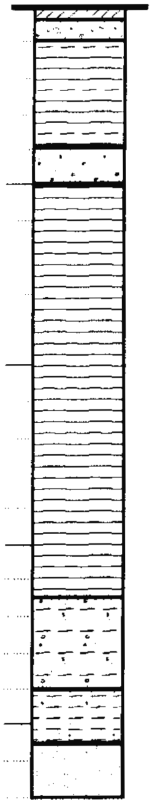
EXPLANATION

☰	Clay
☷	Silt
▨	Sand
▨	Gravel

PID - Photoionization Detector

▼ Water level at time of drilling

SCVWD PILOT STUDY



Depth, feet	Water Level	PID Reading (ppm)	Lithologic Description
			4" thick ASPHALT surface. 8 " thick base rock.
			SILTY CLAY, brown.
			GRAVELLY SAND (SP), dark yellowish brown, moist, loose, gap graded, medium -to coarse-grained sand.
5			
		0.0	CLAY (CL), dark yellowish brown, moist, very soft, medium plasticity.
		0.0	
10			
		0.0	Slightly moist, medium stiff, low plasticity, silty.
			Stiff.
15		0.0	
		0.0	SILTY GRAVELLY SAND (SM), grayish brown, moist, loose, fine grained.
			SANDY SILT (ML), grayish brown, moist, medium stiff, low plasticity.
20		0.0	
			SAND (SP), dark grayish brown, moist, loose, poorly graded, medium grained.
			BOTTOM OF BORING AT 22 FEET.
25			
30			
35			

Sample Interval

REGISTERED GEOLOGIST
JENIFER J. BEATTY
No. 6650
Exp. 4/30/01
STATE OF CALIFORNIA

Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: January 27, 1999
LFR Geologist: Todd Miller, R.G., CH.G.

EXPLANATION

▤ Clay
▤ Silt
▨ Sand
▨ Gravel

PID - Photoionization Detector

▼ Water level at time of drilling

LFR
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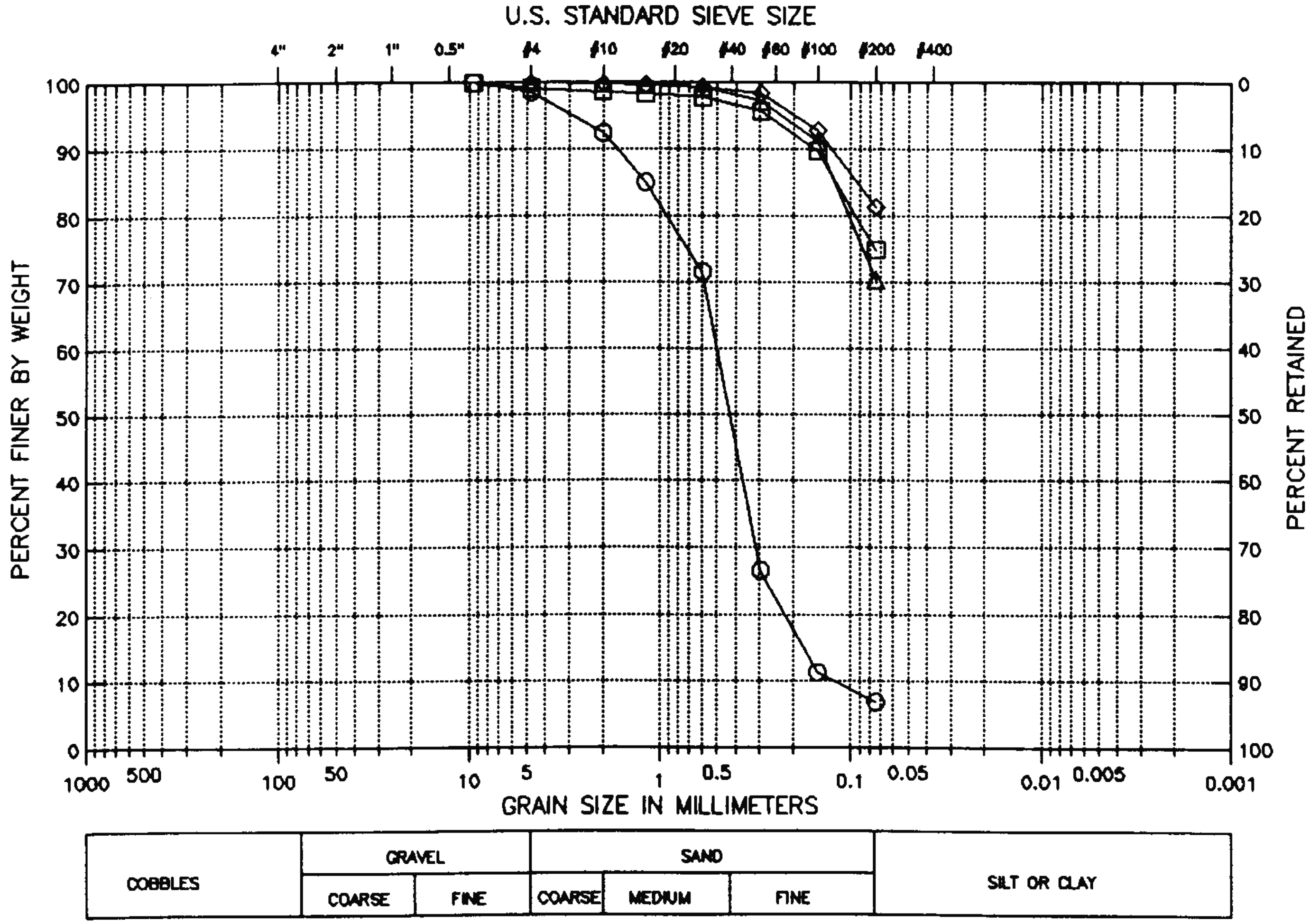
LITHOLOGY FOR 287-BH-03 *(page 1 of 1)*

Project No. 6730.00-024

Project : LEVINE FRICKE RECON 6730.00-024
Project No.: 51-0016148A.00
Location: SCVWD MTBE STUDY MORGAN HILL, CA
Date : Tue Feb 23 1999



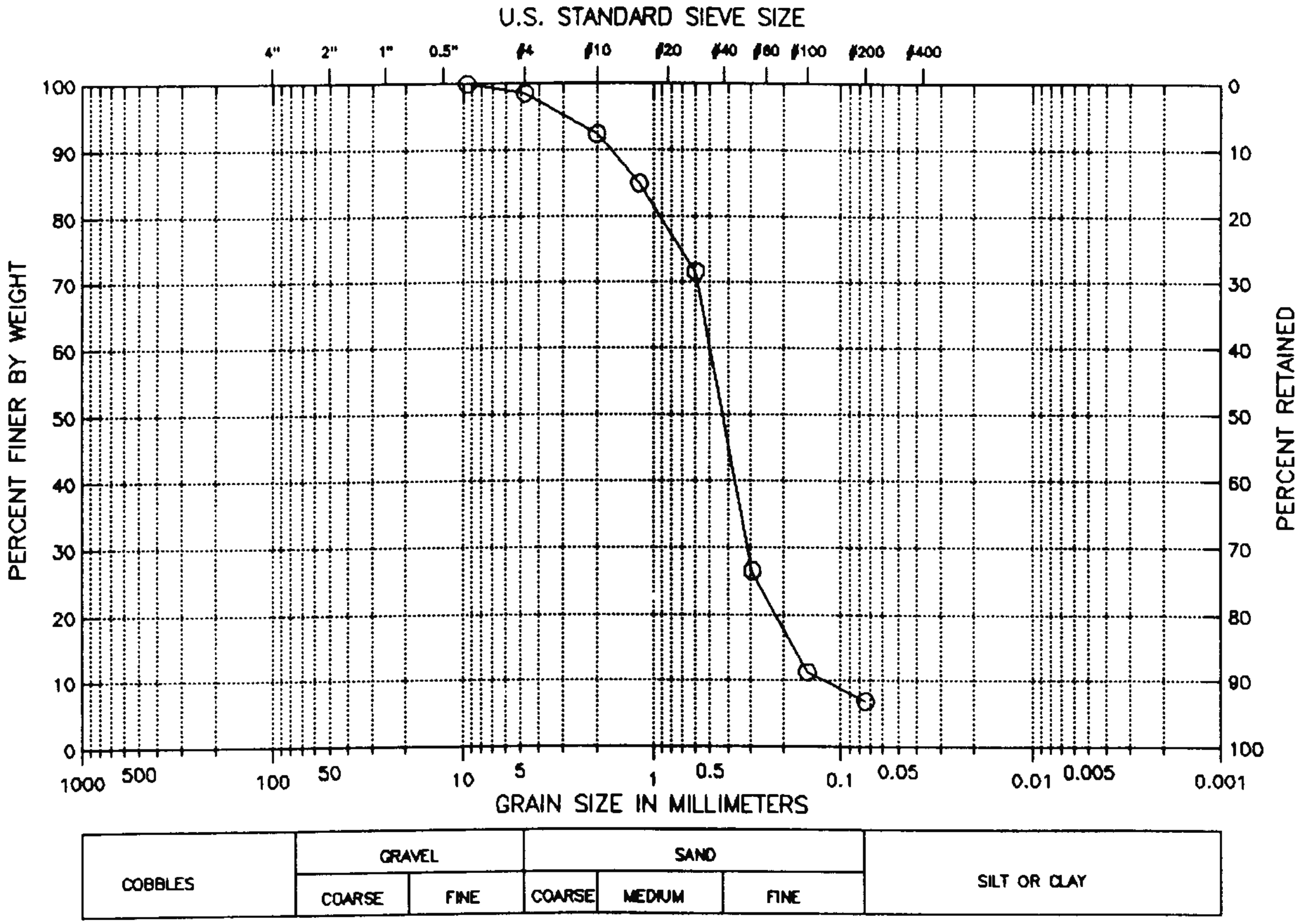
Symbol	Boring No.	Sample No.	Depth	Filename	Classification / Description
○	287-BH-01	13.0 SO	13.0 feet	287-13	SP-SM Poorly graded sand with silt
△	287-BH-01	22.0 SO	22.0 feet	287-22	BROWN FINE SANDY CLAY
□	287-BH-01	25.0 SO	25.0 feet	287-25	BROWN FINE SANDY CLAY
◇	287-BH-01	45.0 SO	45.0 feet	287-45	BROWN FINE SANDY SILTY CLAY

Figure 1

URS Greiner Woodward Clyde

Boring No. : 287-BH-01
Sample No.: 13.0 SO
Tested by : C. WASON
Filename : 287-13

Project : LEVINE FRICKE RECON 6730.00-024
Project No.: 51-0016148A.00
Location: SCVWD MTBE STUDY MORGAN HILL, CA
Date : Tue Feb 23 1999



Classification :
(SP-SM) Poorly graded sand with silt
Visual Description :
LT. BROWN SILTY SAND

Remarks :
Depth: 13.0 feet

Figure 1

Tue Feb 23 09:27:22 1999

GEOTECHNICAL LABORATORY TEST DATA

Project : LEVINE FRICKE RECON 6730.00-024
Project No. : 51-0016148A.00
Boring No. : 287-BH-01
Sample No. : 13.0 SO
Location : SCVWD MTBE STUDY MORGAN HILL, CA
Soil Description : LT. BROWN SILTY SAND
Remarks : Depth: 13.0 feet

Depth : 13.0 feet
Test Date : 02/23/99
Test Method : ASTM D422

Filename : 287-13
Elevation : NA
Tested by : C. WASON
Checked by : S. CAPPS

COARSE SIEVE SET

Sieve Mesh	Sieve Openings Inches	Sieve Openings Millimeters	Weight Retained (gm)	Cumulative Weight Retained (gm)	Percent Finer (%)
0.375"	0.374	9.51	0.00	0.00	100
#4	0.187	4.75	3.19	3.19	99
#10	0.079	2.00	13.22	16.41	93
#16	0.047	1.19	16.35	32.76	85
#30	0.023	0.60	29.58	62.34	72
#50	0.012	0.30	98.95	161.29	27
#100	0.006	0.15	33.70	194.99	11
#200	0.003	0.07	9.72	204.71	7

Total Dry Weight of Sample = 219.7

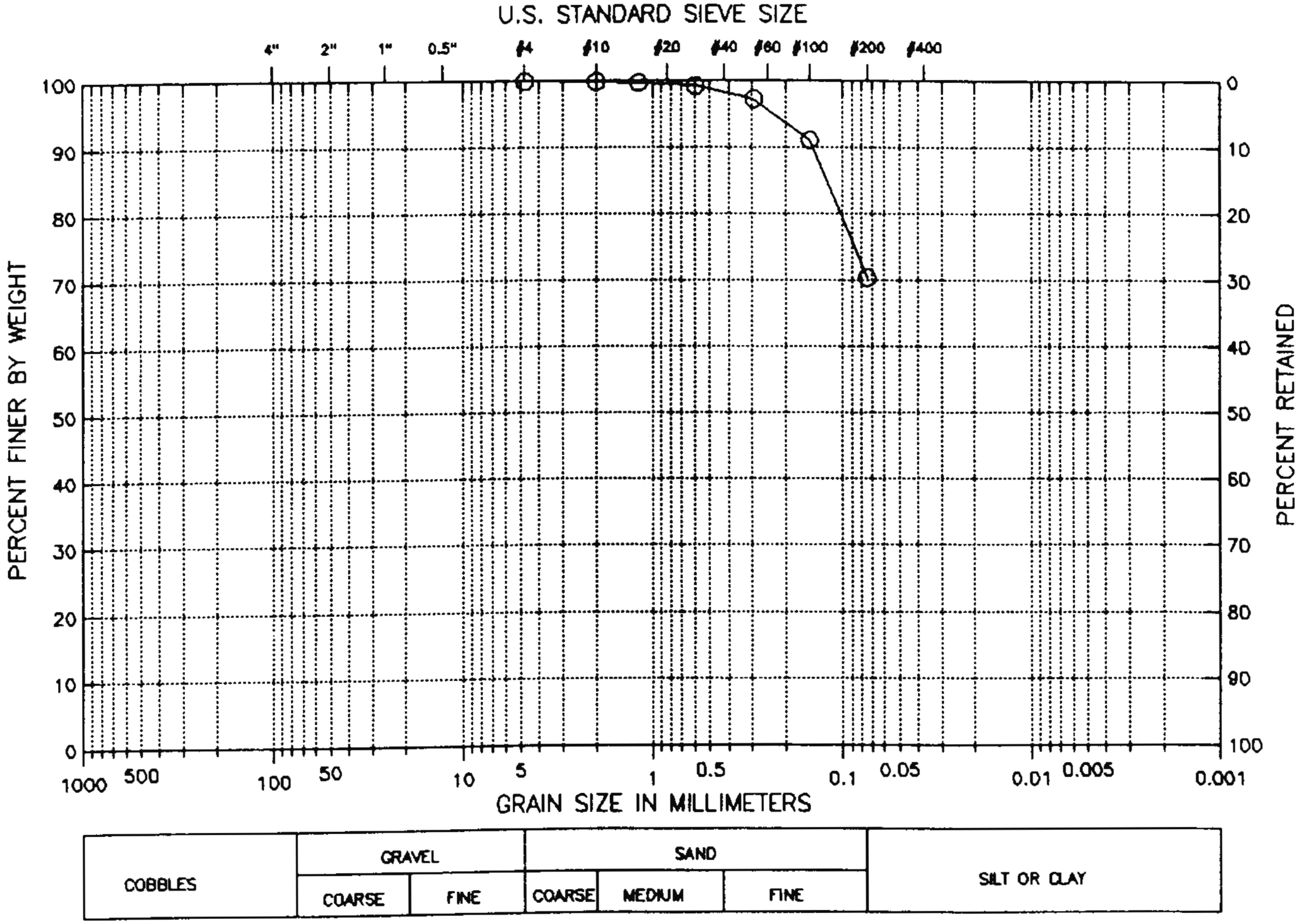
D85 : 1.1846 mm
D60 : 0.4964 mm
D50 : 0.4248 mm
D30 : 0.3111 mm
D15 : 0.1761 mm
D10 : 0.1223 mm

Soil Classification

ASTM Group Symbol : SP-SM
ASTM Group Name : Poorly graded sand with silt
AASHTO Group Symbol : A-1-b(0)
AASHTO Group Name : Stone Fragments, Gravel and Sand

Boring No. : 287-BH-01
Sample No.: 22.0 SO
Tested by : C. WASON
Filename : 287-22

Project : LEVINE FRICKE RECON 6730.00-024
Project No.: 51-0016148A.00
Location: SCVWD MTBE STUDY MORGAN HILL, CA
Date : Tue Feb 23 1999



Classification :

Visual Description :
BROWN FINE SANDY CLAY

Remarks :
Depth: 22.0 feet

Figure 1

URS Greiner Woodward Clyde

Tue Feb 23 09:32:06 1999

GEOTECHNICAL LABORATORY TEST DATA

Project : LEVINE FRICKE RECON 6730.00-024		Filename : 287-22
Project No. : 51-0016148A.00	Depth : 22.0 feet	Elevation : NA
Boring No. : 287-BH-01	Test Date : 02/23/99	Tested by : C. WASON
Sample No. : 22.0 SO	Test Method : ASTM D422	Checked by : S. CAPPS

Location : SCVWD MTBE STUDY MORGAN HILL, CA
Soil Description : BROWN FINE SANDY CLAY
Remarks : Depth: 22.0 feet

COARSE SIEVE SET

Sieve Mesh	Sieve Openings Inches	Millimeters	Weight Retained (gm)	Cumulative Weight Retained (gm)	Percent Finer (%)
#4	0.187	4.75	0.00	0.00	100
#10	0.079	2.00	0.09	0.09	100
#16	0.047	1.19	0.26	0.35	100
#30	0.023	0.60	0.83	1.18	99
#50	0.012	0.30	3.05	4.23	97
#100	0.006	0.15	9.89	14.12	91
#200	0.003	0.07	33.01	47.13	70

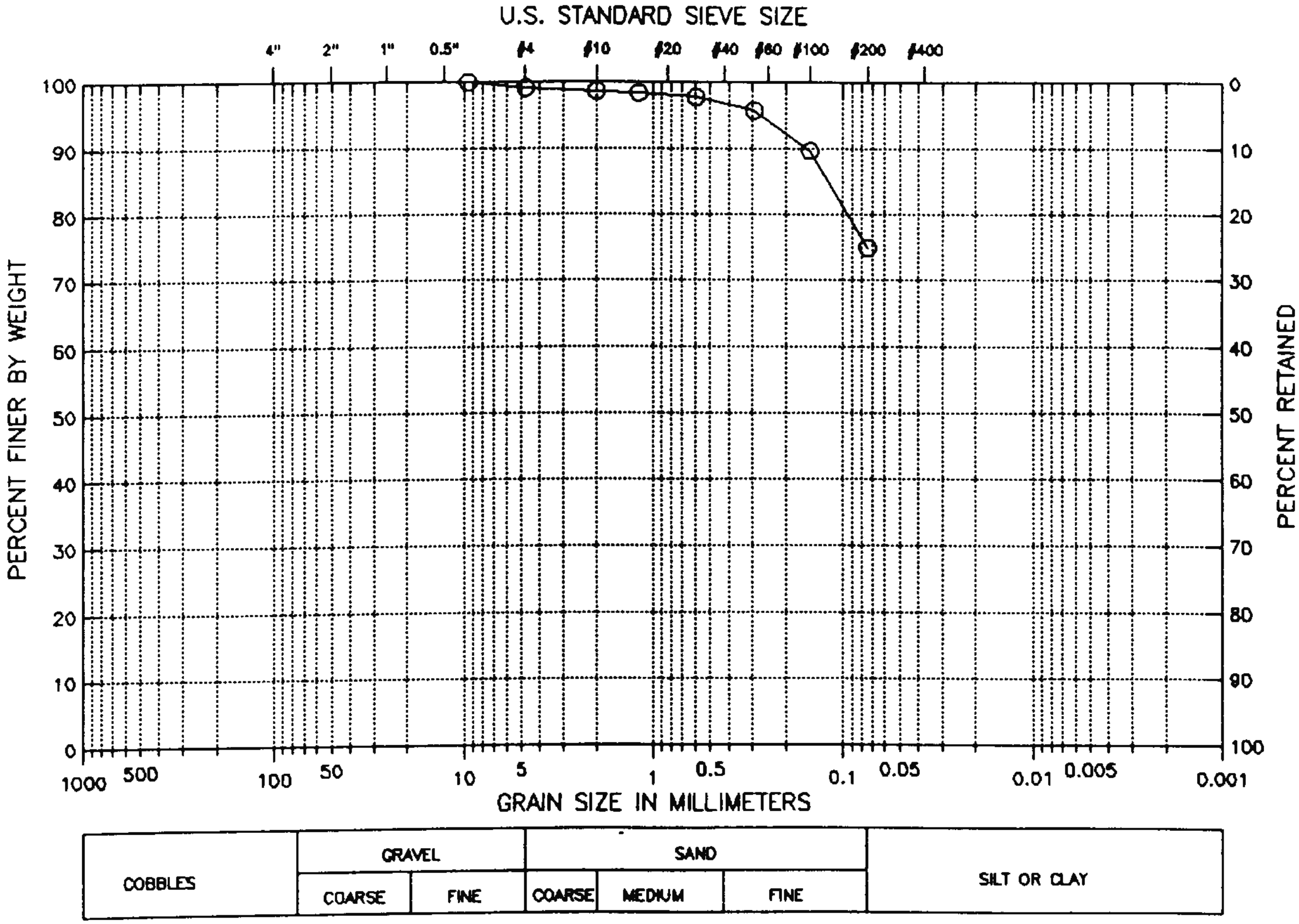
Total Dry Weight of Sample = 159.6

D85 : 0.1210 mm
D60 : N/A
D50 : N/A
D30 : N/A
D15 : N/A
D10 : N/A

Soil Classification
ASTM Group Symbol : N/A
ASTM Group Name : N/A
AASHTO Group Symbol : A-4(0)
AASHTO Group Name : Silty Soils

Boring No. : 287-BH-01
Sample No.: 25.0 SO
Tested by : C. WASON
Filename : 287-25

Project : LEVINE FRICKE RECON 6730.00-024
Project No.: 51-0016148A.00
Location: SCVWD MTBE STUDY MORGAN HILL, CA
Date : Tue Feb 23 1999



Classification :

Remarks :
Depth: 25.0 feet

Visual Description :
BROWN FINE SANDY CLAY

Figure 1

URS Greiner Woodward Clyde

Tue Feb 23 09:48:18 1999

GEOTECHNICAL LABORATORY TEST DATA

Project : LEVINE FRICKE RECON 6730.00-024
Filename : 287-25
Project No. : 51-0016148A.00
Depth : 25.0 feet
Elevation : NA
Boring No. : 287-BH-01
Test Date : 02/23/99
Tested by : C. WASON
Sample No. : 25.0 SO
Test Method : ASTM D422
Checked by : S. CAPPS
Location : SCVWD MTBE STUDY MORGAN HILL, CA
Soil Description : BROWN FINE SANDY CLAY
Remarks : Depth: 25.0 feet

COARSE SIEVE SET

Sieve Mesh	Sieve Openings Inches	Sieve Openings Millimeters	Weight Retained (gm)	Cumulative Weight Retained (gm)	Percent Finer (%)
0.375"	0.374	9.51	0.00	0.00	100
#4	0.187	4.75	1.82	1.82	99
#10	0.079	2.00	0.99	2.81	99
#16	0.047	1.19	0.73	3.54	98
#30	0.023	0.60	1.23	4.77	98
#50	0.012	0.30	4.31	9.08	96
#100	0.006	0.15	12.91	21.99	90
#200	0.003	0.07	31.78	53.77	75

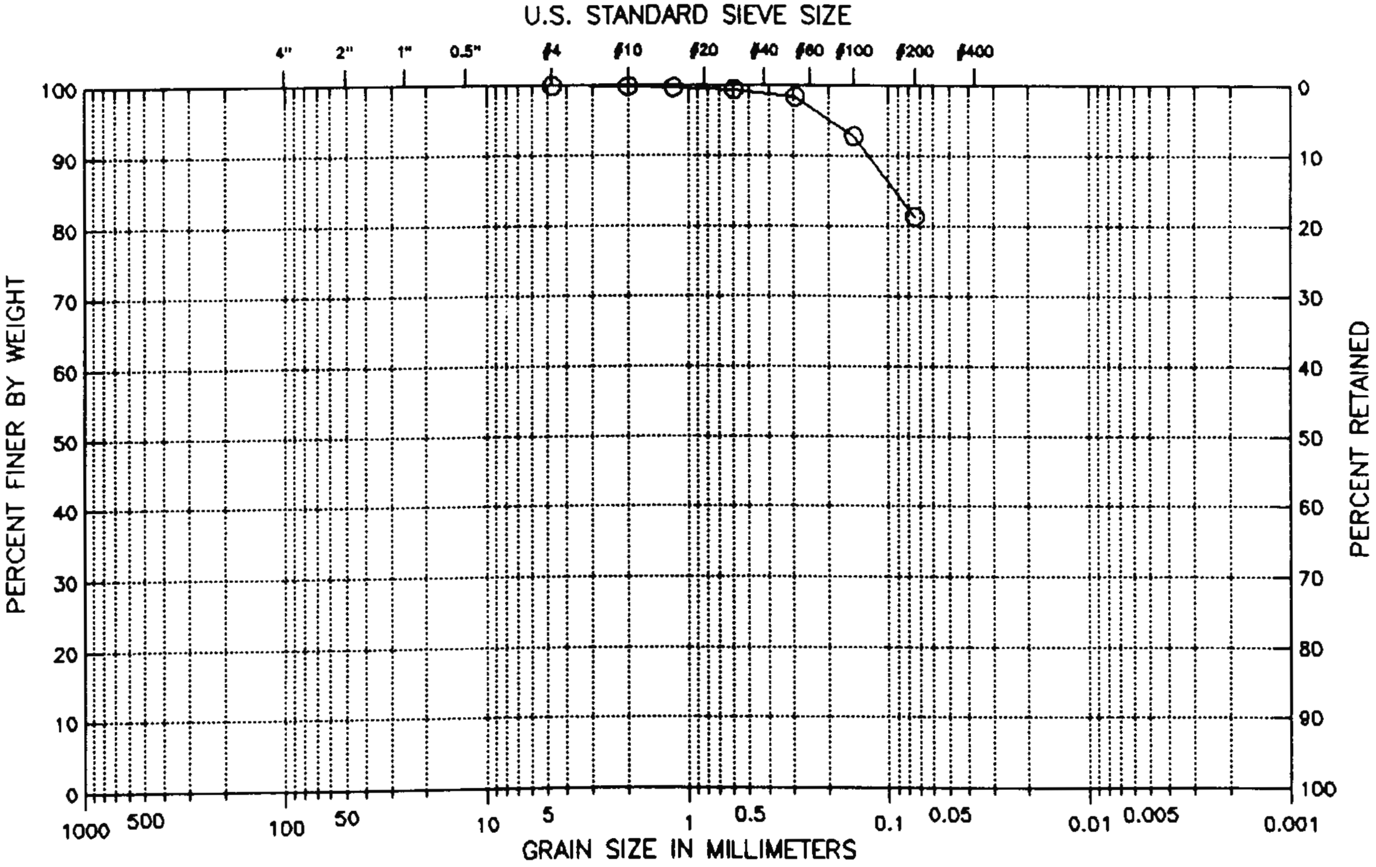
Total Dry Weight of Sample = 214.8

D85 : 0.1189 mm
D60 : N/A
D50 : N/A
D30 : N/A
D15 : N/A
D10 : N/A

Soil Classification
ASTM Group Symbol : N/A
ASTM Group Name : N/A
AASHTO Group Symbol : A-4(0)
AASHTO Group Name : Silty Soils

Boring No. : 287-BH-01
Sample No.: 45.0 SO
Tested by : C. WASON
Filename : 287-45

Project : LEVINE FRICKE RECON 6730.00-024
Project No.: 51-0016148A.00
Location: SCVWD MTBE STUDY MORGAN HILL, CA
Date : Tue Feb 23 1999



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

Classification :

Visual Description :
BROWN FINE SANDY SILTY CLAY

Remarks :
Depth: 45.0 feet

Figure 1

URS Greiner Woodward Clyde

```
Tue Feb 23 11:42:18 1999                                                      Page :  1

                              GEOTECHNICAL LABORATORY TEST DATA

Project : LEVINE FRICKE RECON  6730.00-024                    Filename : 287-45
Project No. : 51-0016148A.00       Depth : 45.0 feet          Elevation : NA
Boring No. : 287-BH-01             Test Date : 02/23/99       Tested by : C. WASON
Sample No. : 45.0 SO               Test Method : ASTM D422    Checked by : S. CAPPS
Location : SCVWD MTBE STUDY  MORGAN HILL, CA
Soil Description : BROWN FINE SANDY SILTY CLAY
Remarks : Depth:  45.0 feet

                              COARSE SIEVE SET
Sieve          Sieve Openings          Weight      Cumulative         Percent
Mesh           Inches   Millimeters    Retained    Weight Retained    Finer
                                       (gm)        (gm)               (%)
----------     ------   -----------    --------    ---------------    -------
#4              0.187       4.75          0.00               0.00        100
#10             0.079       2.00          0.32               0.32        100
#16             0.047       1.19          0.20               0.52        100
#30             0.023       0.60          0.61               1.13         99
#50             0.012       0.30          2.06               3.19         98
#100            0.006       0.15         10.93              14.12         93
#200            0.003       0.07         22.77              36.89         81
     Total Dry Weight of Sample = 198.9

 D85 : 0.0919 mm
 D60 : N/A
 D50 : N/A
 D30 : N/A
 D15 : N/A
 D10 : N/A

 Soil Classification
        ASTM Group Symbol    : N/A
        ASTM Group Name      : N/A
        AASHTO Group Symbol  : A-4(0)
        AASHTO Group Name    : Silty Soils
```

SANTA CLARA VALLEY WATER DISTRICT
Pilot Study of Operating Underground Storage Tanks
Santa Clara County, California

Site Report

SITE NUMBER 289

City of San Jose Mabury Yard
1404 Mabury Road
San Jose, California 95133

June 4, 1999

This Site Report is one of a series of reports prepared for the Santa Clara Valley Water District's Pilot Study of Operating Underground Storage Tanks. The District funded this study to assess if MtBE is being released from UST systems that meet 1998 federal- and state-mandated upgrade requirements. The District will use the results of the Pilot Study, and possibly information obtained during subsequent investigations, to evaluate whether up-graded UST systems that handle MtBE are protective of groundwater quality, and ultimately drinking water. This Study and other District groundwater vulnerability assessments are critical in formulating a plan to protect drinking water supplies into the future.

With cooperation from the site owner and operator and the assistance of the San Jose Fire Department, LFR Levine·Fricke completed a file review, site inspection, and soil-gas, soil, and groundwater sampling at this site on behalf of the District. LFR's subcontractor, Integrated Engineering Services, completed a UST inspection at this site. This report provides a brief summary of investigation findings, and site-specific data in tables, figures, and appendices. This Site Report is appended to the Summary Report for the Study.

LFR
LEVINE•FRICKE
1900 Powell Street, 12th Floor
Emeryville, California 94608-1827
(510) 652-4500/Fax (510) 652-2246

SUMMARY OF FINDINGS

SITE DESCRIPTION

Figure 1 illustrates the site location. Site geology consists primarily of coarse grained materials (silty gravelly sands and clayey sandy silt) to approximately 7 feet below ground surface (bgs) underlain by clays and silts to approximately 40 feet bgs. Data obtained from CPT logs indicates sands from approximately 40 to 46 feet bgs. The shallowest depth to groundwater measured was approximately 23 feet bgs (March 1999).

SYSTEM DESCRIPTION

Records indicate that the UST system at the site consists of three 12,000-gallon double-walled USTs (one gasoline UST and two diesel USTs) constructed of fiberglass, with double-walled fiberglass piping. The UST system utilizes continuous interstitial monitoring for both piping and UST leak detection as well as mechanical line leak detection for piping leak detection.

RESULTS

MtBE was detected at this Site in 1 of 4 soil-gas samples collected at a concentration of 0.048 μg/l. Petroleum hydrocarbons (benzene, toluene, ethylbenzene, and/or xylenes) were detected in the same soil-gas sample at low concentrations. No MtBE or petroleum hydrocarbons were detected in soil or groundwater samples collected from this site.

SITE SELECTION CRITERIA MET

1998 upgrade compliant?	Yes
On SCVWD fuel leak database?	No
Status:	Not applicable
Distance from LUST site:	Greater than 250 feet
Distance to water supply well:	Less than 2000 feet
Access granted?	Yes
SCVWD approved?	Yes

FILE REVIEW SUMMARY

Number of tanks:	3
Reported release?	Yes, see Comments below
Release date:	Not applicable
Fuel released:	Not applicable
Location:	Not applicable
Quantity (gallons):	Not applicable
Data available:	Not applicable

Comments:

Release date unknown, discovered during tank removal (10/16/96). Comments on 3/6/97 release report: "removed additional soil in area of diesel tank dispenser where highest concentrations of petroleum hydrocarbons were detected." Laboratory data indicates TPHg and MtBE detected in 3 of 9 soil samples collected beneath the USTs on 10/16/96 at concentrations up to 140 mg/kg and 4.1 mg/kg, respectively (MtBE analyzed by EPA Method 8020). Soil samples collected from the excavation pit at 14 and 18 feet on 10/29 were ND. Soil samples collected from beneath piping indicated TPHd and TPHg up to 7,400 mg/kg and 840 mg/kg, respectively, but no MtBE or benzene. Results for 6 soil samples collected on 11/21/96 from the excavation pit did not indicate the presence of TPHg, benzene, or MtBE with the exception of 1.6 mg/kg of TPHg found in 1 sample. Results for 2 soil samples collected on 12/2/96 from the excavation pit indicated TPHg and MtBE in 1 sample at 460 mg/kg and 1.8 mgkg, respectively.

SITE VISIT - UST SYSTEM INFORMATION

Precision tank tightness records available?	No
Date of last test:	Not applicable
Method of tank testing:	Not applicable
Tank leak rate (gallons/hour):	Not applicable
UST overfill prevention system present?	Yes
Type of system:	Both overfill limiter and drop tube/check-valve
Automatic shut-off?	Yes
System operational?	Yes
Overfill containment (gallons):	15
Drop tube equipped with striker plate?	Yes
Under island containment present?	Yes
Under island containment monitoring:	None
Quick release dispenser hoses?	Yes
Alarm system functional?	Yes
Type:	Shut-off
Vents:	
Vent type:	Dedicated
Vent piping:	Double walled
Condition of UST turbine sump:	Good
Condition of UST flex line sump:	Good
Vapor recovery system:	Balanced
Years of operation since upgrade:	Approximately 2.5 years
Years of operation as fueling facility:	Approximately 16 years
Estimated throughput:	Less than 100,000 gallons per month
Monitoring systems operational?	Yes
Systems operations, comment:	Veederoot
Tank annular space monitoring:	Liquid probe
Overfill containment monitoring system:	Liquid probe
Piping leak detection:	Combined (pressure line leak detection and liquid probe)
Is system monitored?	Yes
Station inventory records available?	Yes
Records up to date?	Not kept at site - not reviewed
Records complete?	Not kept at site - not reviewed
Supplier log reviewed?	Not kept at site - not reviewed
Spill log reviewed?	No
Spill log comments:	None avaliable

Personnel training: Not sure what department has records.

Comments:

Monitoring system checked regularly by a maintenance company.

SITE INSPECTION

Condition of apron around pumps:	Good
Evidence of recent paving/regrading?	No
Location of recent paving/regrading:	Not applicable
Description of surface drainage?	To southeast
Direct route for surface spills to subsurface?	No
Description of route to subsurface:	Not applicable
Other potential petroleum sources?	Yes
Description of other petroleum sources:	Former service bays (under demolition)
Nearby surface water?	No
Name of surface water:	Not applicable
Type of surface water:	Not applicable

Comments:

No plans available.

UST SYSTEM DATA FROM FORM B COLLECTED DURING FILE REVIEWS - TANK ID # tank 1

Date installed:	10/25/96
Tank capacity (gallons):	12,000
Tank contents:	Diesel
Tank construction:	
Type of system:	Double wall
Tank material (primary tank):	Fiberglass
Lining compatible with 100% methanol:	No
Exterior corrosion protection:	Fiberglass reinforced plastic
Date spill containment installed:	1996
Date overfill protection equipment installed:	1996
Drop tube:	Not noted
Striker plate:	Not noted
Dispenser containment:	Not noted
Piping information:	
System type:	Pressure, underground
Construction:	Double wall, underground
Material and corrosion protection:	Fiberglass pipe, underground
Leak detection:	Mechanical line leak detection Continuous interstitial monitoring

Tank leak detection?	Continuous interstitial monitoring

UST SYSTEM DATA FROM FORM B COLLECTED DURING FILE REVIEWS - TANK ID # tank 2

Date installed:	10/25/96
Tank capacity (gallons):	12,000
Tank contents:	Diesel
Tank construction:	
Type of system:	Double wall
Tank material (primary tank):	Fiberglass
Lining compatible with 100% methanol:	No
Exterior corrosion protection:	Fiberglass reinforced plastic
Date spill containment installed:	1996
Date overfill protection equipment installed:	1996
Drop tube:	Not noted
Striker plate:	Not noted
Dispenser containment:	Not noted
Piping information:	
System type:	Pressure, underground
Construction:	Double wall, underground
Material and corrosion protection:	Fiberglass pipe, underground
Leak detection:	Mechanical line leak detection Continuous interstitial monitoring
Tank leak detection?	Continuous interstitial monitoring

UST SYSTEM DATA FROM FORM B COLLECTED DURING FILE REVIEWS - TANK ID # unknown

Date installed:	10/25/96
Tank capacity (gallons):	12,000
Tank contents:	Premium unleaded
Tank construction:	
Type of system:	Double wall
Tank material (primary tank):	Fiberglass
Lining compatible with 100% methanol:	Yes
Exterior corrosion protection:	Fiberglass reinforced plastic
Date spill containment installed:	1996
Date overfill protection equipment installed:	1996
Drop tube:	Not noted
Striker plate:	Not noted
Dispenser containment:	Not noted
Piping information:	
System type:	Pressure, underground
Construction:	Double wall, underground

Material and corrosion protection:	Fiberglass pipe, underground
Leak detection:	Mechanical line leak detection Continuous interstitial monitoring
Tank leak detection?	Continuous interstitial monitoring

Table 1
Summary of Chemical Analysis Results for Soil-Gas Samples - Site #289
Santa Clara Valley Water District

Location	Date Sampled	Depth (ft bgs)	Methyl Tertiary Butyl Ether (MTBE) ug/L	TPH as Gasoline (TPHg) ug/L	Benzene (B) ug/L	Toluene (T) ug/L	Ethyl Benzene (E) ug/L	meta/para-Xylenes (m/p-X) ug/L	ortho-Xylene (o-X) ug/L	Notes
289-SG-01	03/15/99	8	<5	<100	<1	1.0	<1	<1	<1	
289-SG-02	03/16/99	10	<5	<100	<1	<1	<1	<1	<1	
289-SG-02-SPL		10	0.048	NA	0.025	0.41	0.082	0.36	0.11	(a)
289-SG-03	03/16/99	10	<5	<100	<1	<1	<1	<1	<1	

Table proofed by CLC.

Notes:

(a) Other analytes detected: Ethanol (0.046 ug/L), Methanol (0.23 ug/L), and n-Butyl ethyl ether (7.9 ug/L)

All primary and field duplicate (-DUP) samples were analyzed on site by InterPhase, of Los Angeles, CA using EPA Method 8020 for MTBE and BTEX, and Modified EPA Method 8015 for TPHg.

Additional field duplicate samples (-SPL) were analyzed off site by Air Toxics, Ltd., Folsom, CA using EPA Method TO-14.

ft bgs = feet below ground surface

NA = Not analyzed

TPH = total petroleum hydrocarbons

ug/L = micrograms per liter

Data Qualifiers (if shown on table):

E = Exceeds the calibration range

I = Interference by the sample matrix

J = Estimated value

J = Not detected at the estimated reporting limit shown

T[illegible]e 2

Summary of Chemical Analysis Results for Soil Samples - Site #289

Santa Clara Valley Water District

Location	Date Sampled	Depth (ft bgs)	Methyl Tertiary Butyl Ether (MTBE) ug/Kg	TPH as Gasoline (TPHg) mg/Kg	Benzene (B) ug/Kg	Toluene (T) ug/Kg	Ethyl Benzene (E) ug/Kg	meta/para-Xylenes (m/p-X) ug/Kg	ortho-Xylene (o-X) ug/Kg	Di-isopropyl Ether (DIPE) ug/Kg	Ethyl Tertiary Butyl Ether (ETBE) ug/Kg	Tertiary Amyl Methyl Ether (TAME) ug/Kg	Tertiary Butyl Alcohol (TBA) ug/Kg
289-BH-01	03/17/99	7.5-8.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		13.0-13.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		21.5-22.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
289-BH-02	03/17/99	7.0-7.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		12.5-13.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		28.0-28.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
289-BH-03	03/17/99	11.5-12.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		19.0-19.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		36.5-37.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
289-BH-04	03/18/99	7.0-7.3	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		13.0-13.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		22.0-22.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
289-BH-05	03/18/99	7.5-8.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		13.0-13.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		22.0-22.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
289-BH-06	03/18/99	6.0-6.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		12.0-12.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		21.5-22.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200

Table proofed by CLC.

Notes:

All samples were analyzed by Alpha Analytical, Inc. of Sparks, NV, using EPA Method 8260 for MTBE, BTEX, DIPE, ETBE, TAME, and TBA, and Modified EPA Method 8015 for TPHg.

ft bgs = feet below ground surface
mg/Kg = milligrams per kilogram
TPH = total petroleum hydrocarbons
ug/Kg = micrograms per kilogram

Data Qualifiers (if shown on table):

J = Estimated value
UJ =Not detected at the estimated reporting limit shown

Table 3
Summary of Chemical Analysis Results for Groundwater Samples - Site # 289
Santa Clara Valley Water District

Location	Date Sampled	Depth (ft bgs)	Methyl Tertiary Butyl Ether (MTBE) ug/L	TPH as Gasoline (TPHg) mg/L	Benzene (B) ug/L	Toluene (T) ug/L	Ethyl Benzene (E) ug/L	meta/para-Xylenes (m/p-X) ug/L	ortho-Xylene (o-X) ug/L	Di-isopropyl Ether (DIPE) ug/L	Ethyl Tertiary Butyl Ether (ETBE) ug/L	Tertiary Amyl Methyl Ether (TAME) ug/L	Tertiary Butyl Alcohol (TBA) ug/L
289-BH-01	03/17/99	29.0-39.0	<0.5	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<10
289-BH-02	03/17/99	27.0-37.0	<0.5	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<10
289-BH-02-DUP		27.0-37.0	<0.5	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<10
289-BH-03	03/17/99	33.0-43.0	<0.5	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<10
289-BH-04	03/18/99	37.5-42.5	<0.5	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<10
289-BH-05	03/18/99	38.0-43.0	<0.5	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<10
289-BH-06	03/18/99	50.0-52.0	<0.5	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<10

Table proofed by CLC.

Notes:

All primary and field duplicate (-DUP) samples were analyzed by Alpha Analytical, Inc. of Sparks, NV, using EPA Method 8260 for MTBE, BTEX, DIPE, ETBE, TAME, and TBA, and Modified EPA Method 8015 for TPHg.

ft bgs = feet below ground surface
mg/L = milligrams per liter
TPH = total petroleum hydrocarbons
ug/L = micrograms per liter

Data Qualifiers (if shown on table):

J = Estimated value
UJ =Not detected at the estimated reporting limit shown

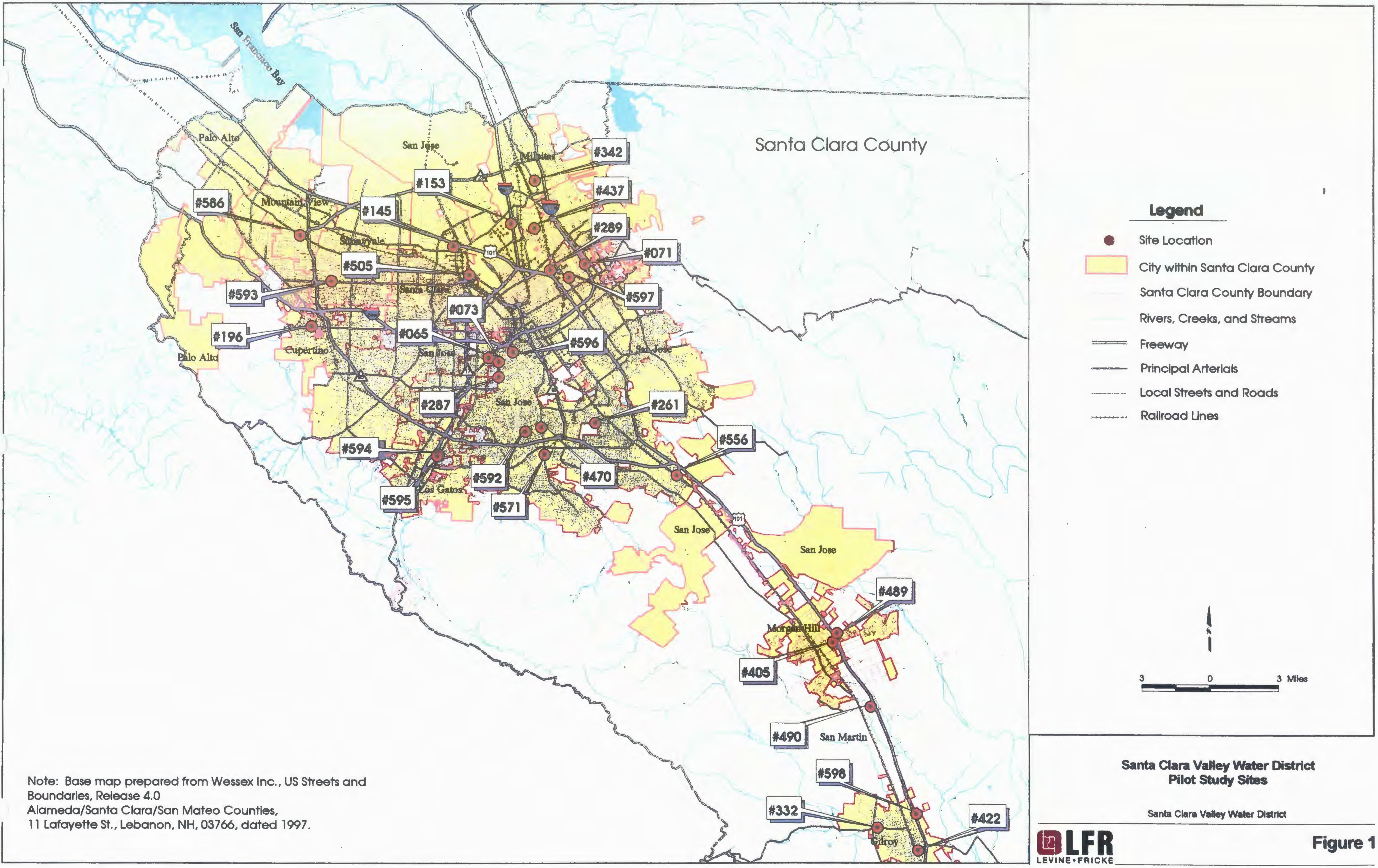
Table 4
Summary of Physical Parameters for Soil Samples - Site #289
Santa Clara Valley Water District

Location	Depth (ft bgs)	Visual Description	Total Organic Carbon (percent)	Moisture Content (percent)	Wet Weight (lbs/cu.ft.)	Dry Unit Weight (lbs/cu.ft.)	Porosity (percent)
289-BH-03	33.5 - 34.0	Gray clay	0.13	26.57	122.6	96.9	42.47
289-BH-05	10.0 - 10.5	Grayish brown clay	0.14	30.32	115.6	88.7	47.34

Table proofed by CLC.

Notes:

Specific gravity values were 2.70 for all samples analyzed.
Total organic carbon analyses were performed by Curtis and Tompkins Analytical Laboratories, Berkeley, CA.
All other analyses were performed by URS Greiner Woodward Clyde, Oakland, CA.
ft bgs = feet below ground surface
lbs/cu.ft. = pounds per cubic foot
NA = Not analyzed



Note: Base map prepared from Wessex Inc., US Streets and Boundaries, Release 4.0
Alameda/Santa Clara/San Mateo Counties,
11 Lafayette St., Lebanon, NH, 03766, dated 1997.

Santa Clara Valley Water District
Pilot Study Sites

Santa Clara Valley Water District

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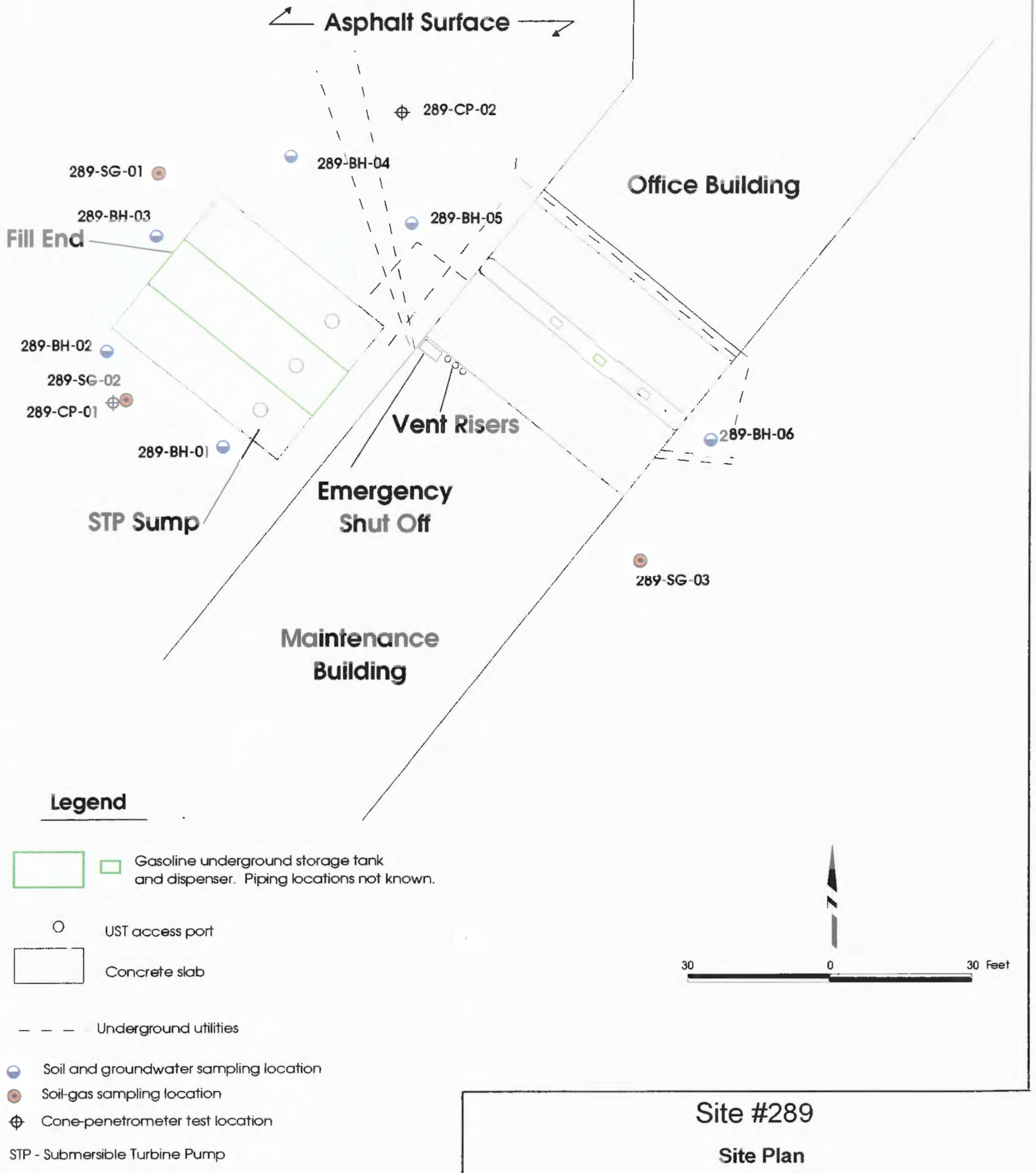
Figure 1



Note: Base map prepared from LFR field plan.

Site #289

Site Plan

Santa Clara Valley Water District

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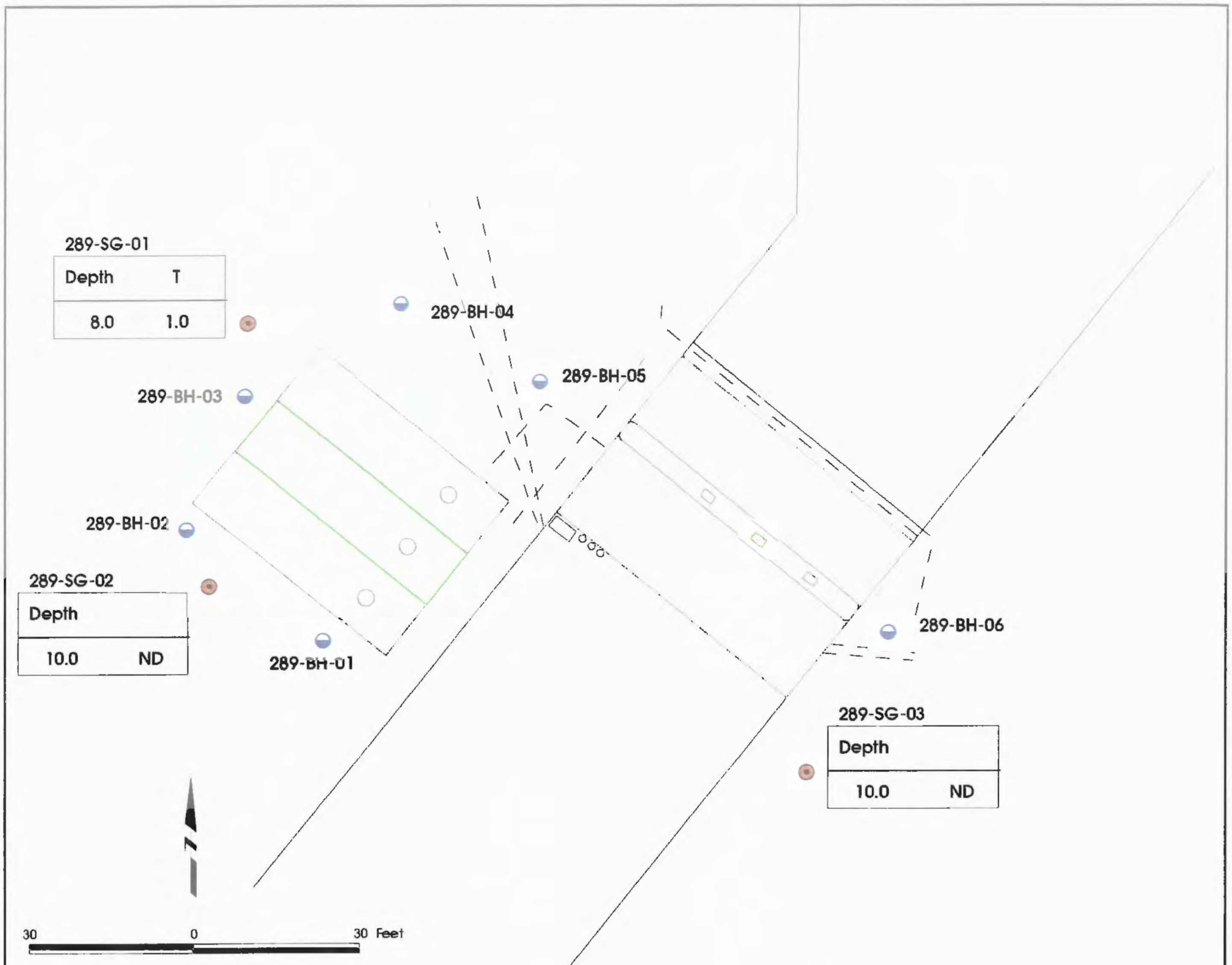
Figure 2

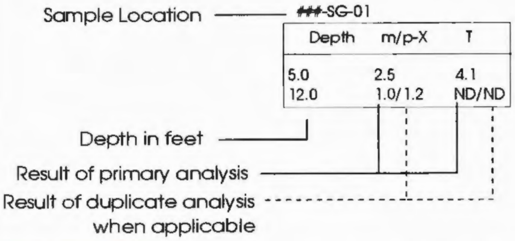


Legend

● Soil-gas sampling location

◒ Soil and groundwater sampling location

The following represents a hypothetical sampling point and defines the characters associated with that point:



🟩 Gasoline underground storage tank and dispenser.

○ UST access port

☐ Concrete slab

– – – Underground utilities

See Figure 2 for description of site features and origin of base map.

Notes

Concentrations of analytes detected are presented; analytes not detected are not presented or are presented as ND (not detected). MTBE and BTEX were analyzed using EPA Method 8020 and TPHg was analyzed using Modified EPA Method 8015.

Results in micrograms/liter (ug/L)
RL = Reporting Limit

Each sample was analyzed for the following:

MTBE = Methyl Tertiary Butyl Ether (RL = 5 ug/L)
TPHg = Total Petroleum Hydrocarbons as Gasoline (RL = 100 ug/L)
B = Benzene (RL = 1 ug/L)
T = Toluene (RL = 1 ug/L)
E = Ethyl Benzene (RL = 1 ug/L)
m/p-X = meta/para-Xylenes (RL = 1 ug/L)
o-X = ortho-Xylene (RL = 1 ug/L)

Site #289

Summary of Chemical Analysis Results for Soil-Gas Samples

Santa Clara Valley Water District

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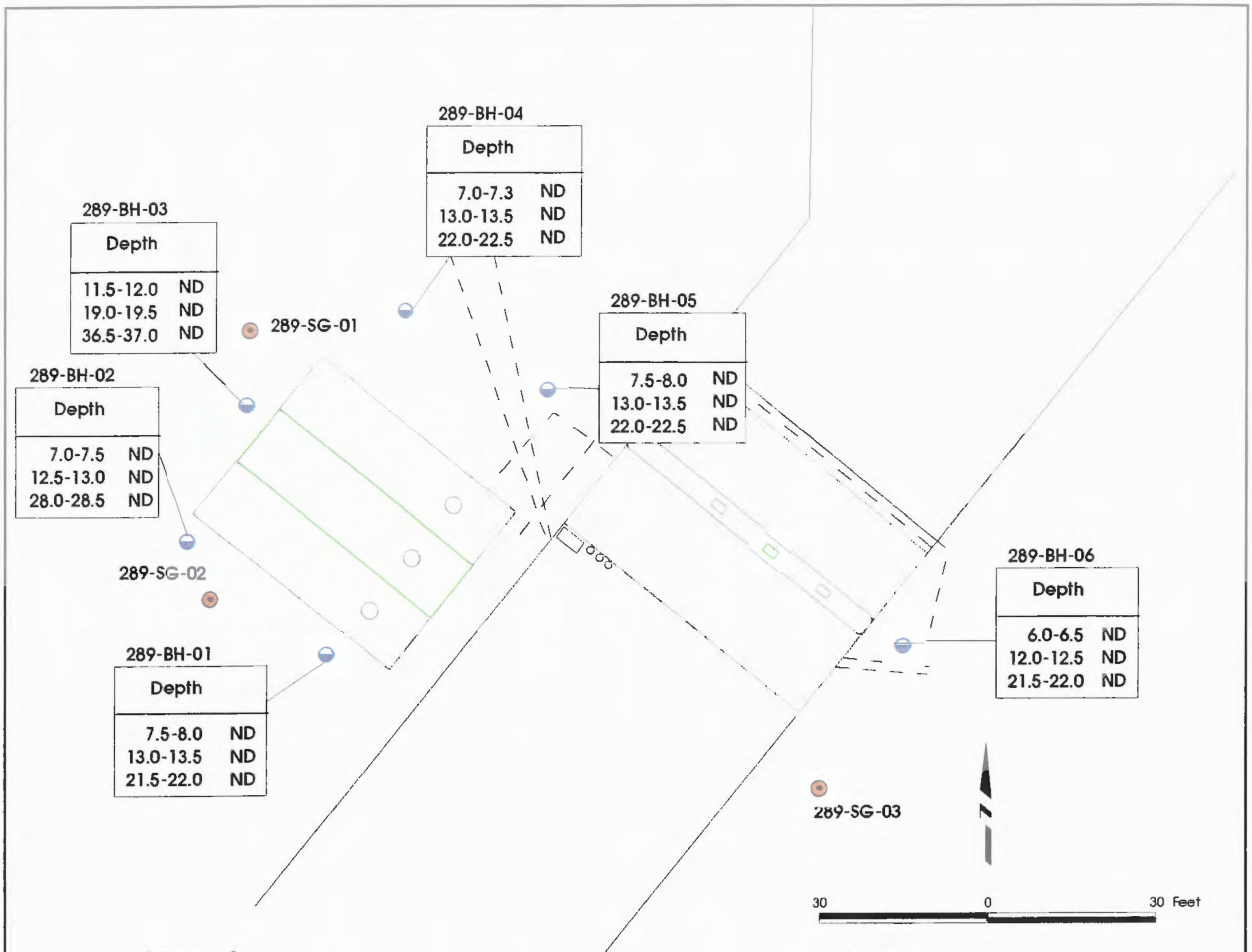
Figure 3

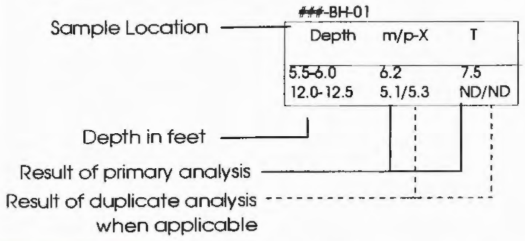


Legend

◒ Soil and groundwater sampling location

◉ Soil-gas sampling location

The following represents a hypothetical sampling point and defines the characters associated with that point:



🟩 🟩 Gasoline underground storage tank and dispenser.

○ UST access port

▭ Concrete slab

— — — Underground utilities

See Figure 2 for description of site features and origin of base map.

Notes

Concentrations of analytes detected are presented; analytes not detected are not presented or are presented as ND (not detected). TPHg was analyzed using Modified EPA Method 8015, all other analytes were analyzed using EPA Method 8260.

Results in micrograms/kilogram (ug/Kg) for all compounds except TPHg which is presented in milligrams/kilogram (mg/Kg).

RL = Reporting Limit

Each sample was analyzed for the following:

MTBE = Methyl Tertiary Butyl Ether (RL = 5 ug/Kg)
TPHg = Total Petroleum Hydrocarbons as Gasoline (RL = 1 mg/Kg)
B = Benzene (RL = 5 ug/Kg)
T = Toluene (RL = 5 ug/Kg)
E = Ethyl Benzene (RL = 5 ug/Kg)
m/p-X = meta/para-Xylenes (RL = 5 ug/Kg)
o-X = ortho-Xylene (RL = 5 ug/Kg)
DIPE = Di-isopropyl Ether (RL = 20 ug/Kg)
ETBE = Ethyl Tertiary Butyl Ether (RL = 20 ug/Kg)
TAME = Tertiary Amyl Methyl Ether (RL = 20 ug/Kg)
TBA = Tertiary Butyl Alcohol (RL = 200 ug/Kg)

Site #289

Summary of Chemical Analysis Results for Soil Samples

Santa Clara Valley Water District

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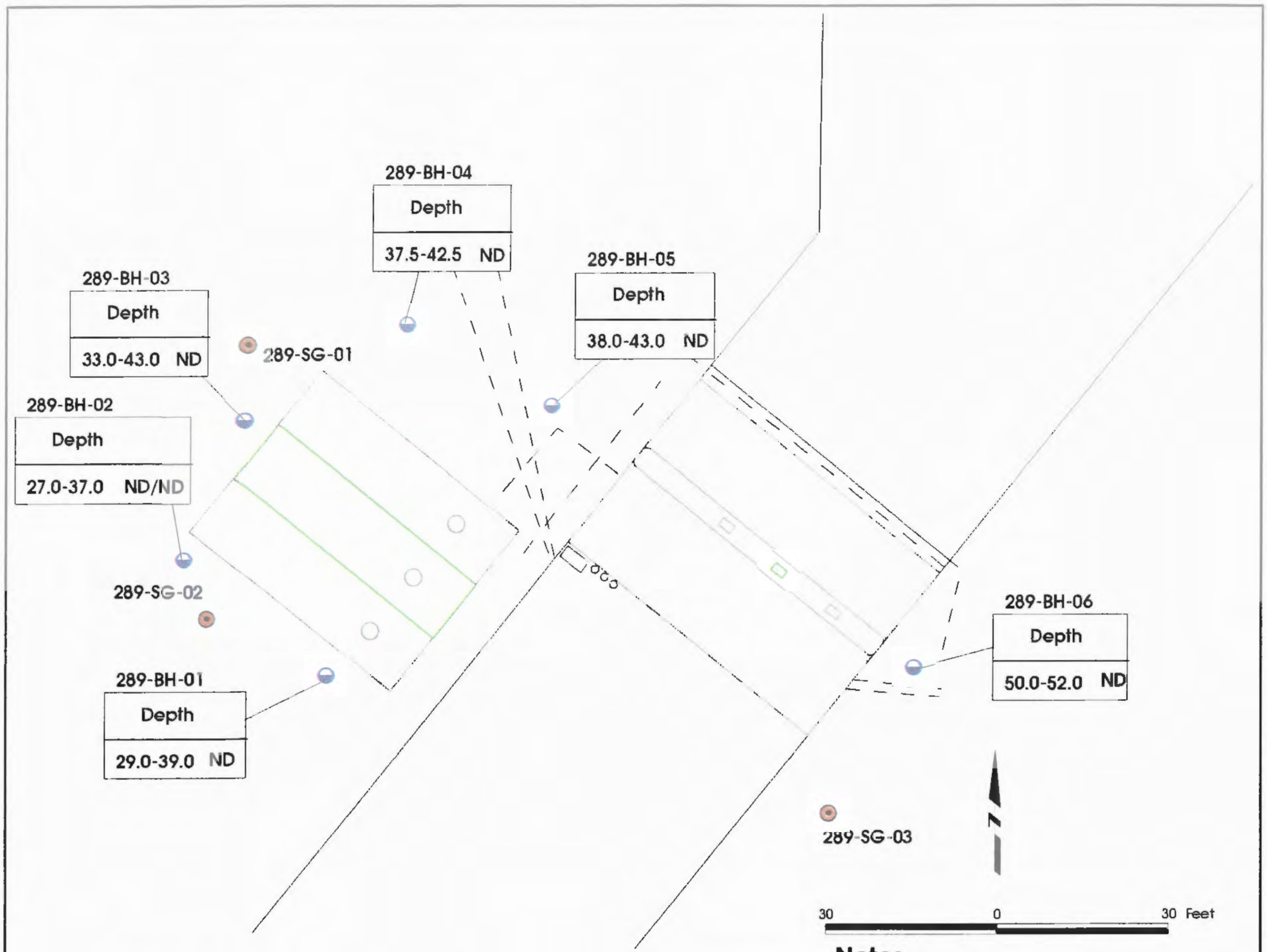
Figure 4



Legend

🔵 Soil and groundwater sampling location

🟠 Soil-gas sampling location

The following represents a hypothetical sampling point and defines the characters associated with that point:

Sample Location — ###-BH-01

Depth	m/p-X	T
5.5-6.0 12.0-12.5	6.2 5.1/5.3	7.5 ND/ND

Depth in feet

Result of primary analysis

Result of duplicate analysis when applicable

🟩 Gasoline underground storage tank and dispenser.

○ UST access port

☐ Concrete slab

— — — Underground utilities

See Figure 2 for description of site features and origin of base map.

Notes

Concentrations of analytes detected are presented; analytes not detected are not presented or are presented as ND (not detected). TPHg was analyzed using Modified EPA Method 8015, all other analytes were analyzed using EPA Method 8260.

Results in micrograms/liter (ug/L) for all compounds except TPHg which is presented in milligrams/liter (mg/L).

RL = Reporting Limit

Each sample was analyzed for the following:

MTBE = Methyl Tertiary Butyl Ether (RL = 0.5 ug/L)
TPHg = Total Petroleum Hydrocarbons as Gasoline (RL = 0.05 mg/L)
B = Benzene (RL = 0.5 ug/L)
T = Toluene (RL = 0.5 ug/L)
E = Ethyl Benzene (RL = 0.5 ug/L)
m/p-X = meta/para-Xylenes (RL = 0.5 ug/L)
o-X = ortho-Xylene (RL = 0.5 ug/L)
DIPE = Di-isopropyl Ether (RL = 1 ug/L)
ETBE = Ethyl Tertiary Butyl Ether (RL = 1 ug/L)
TAME = Tertiary Amyl Methyl Ether (RL = 1 ug/L)
TBA = Tertiary Butyl Alcohol (RL = 10 ug/L)

Site #289

Summary of Chemical Analysis Results for Groundwater Samples

Santa Clara Valley Water District

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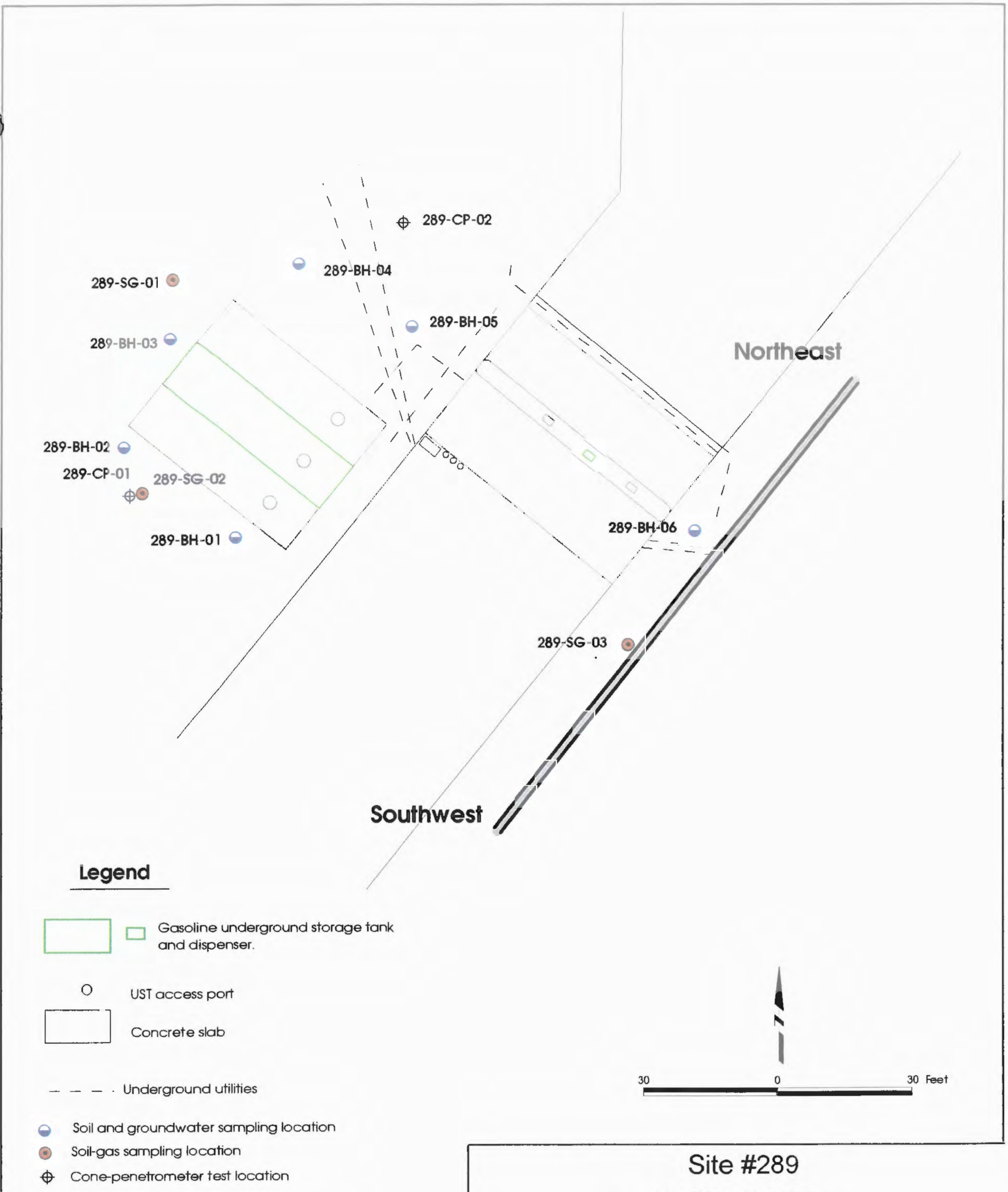
Figure 5



See Figure 2 for description of site features and origin of base map.

Site #289

Site Plan Showing Orientation of Vertical Profile

Santa Clara Valley Water District

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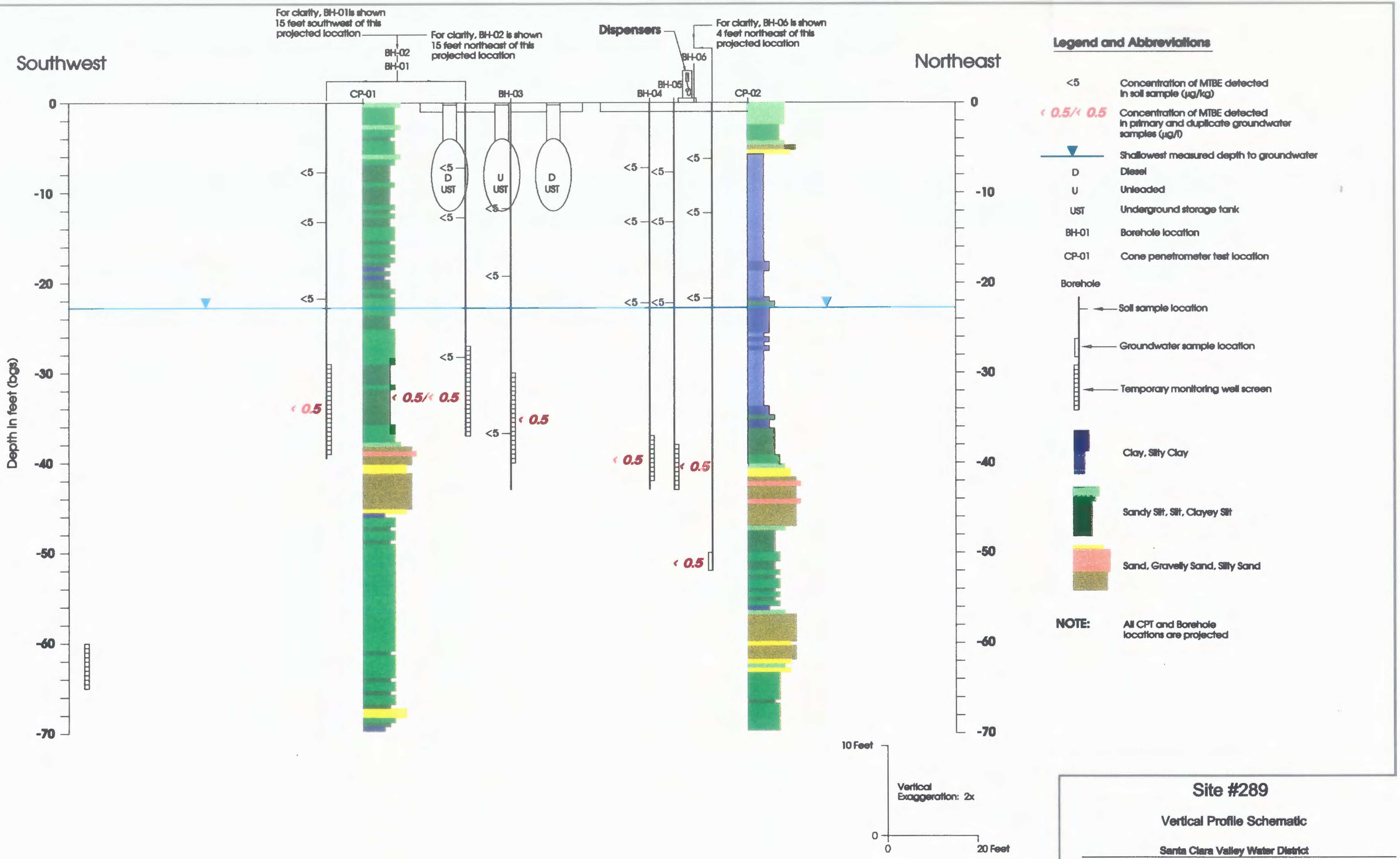
Figure 6


Southwest
Northeast
For clarity, BH-01 is shown 15 feet southwest of this projected location
For clarity, BH-02 is shown 15 feet northeast of this projected location
Dispensers
For clarity, BH-06 is shown 4 feet northeast of this projected location
BH-02
BH-01
CP-01
BH-03
BH-04
BH-05
BH-06
CP-02
Depth in feet (bgs)
0
-10
-20
-30
-40
-50
-60
-70
<5
D
UST
U
UST
D
UST
‹ 0.5
‹ 0.5/‹ 0.5
‹ 0.5
‹ 0.5
‹ 0.5
‹ 0.5
Legend and Abbreviations
<5 Concentration of MTBE detected in soil sample (µg/kg)
‹ 0.5/‹ 0.5 Concentration of MTBE detected in primary and duplicate groundwater samples (µg/l)
Shallowest measured depth to groundwater
D Diesel
U Unleaded
UST Underground storage tank
BH-01 Borehole location
CP-01 Cone penetrometer test location
Borehole
Soil sample location
Groundwater sample location
Temporary monitoring well screen
Clay, Silty Clay
Sandy Silt, Silt, Clayey Silt
Sand, Gravelly Sand, Silty Sand
NOTE: All CPT and Borehole locations are projected
10 Feet
Vertical Exaggeration: 2x
0
0
20 Feet

J:\ENGCAD\6730\CM#289.DWG 04/21/99 CM#505.PCP

Site #289

Vertical Profile Schematic

Santa Clara Valley Water District

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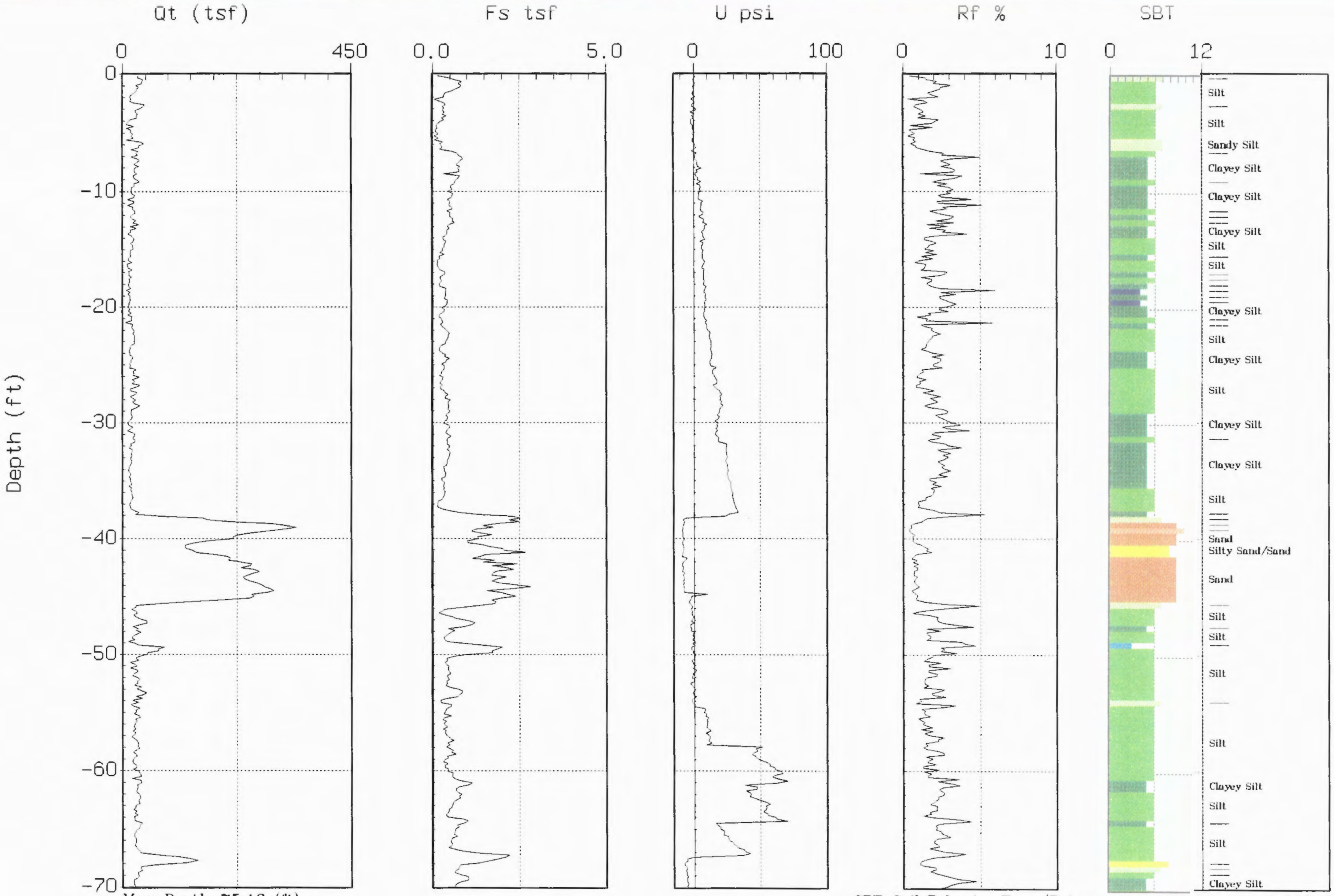
Figure 7

LFR LEVINE.FRICKE

Site: 289 SAN JOSE YARD
Location : 289-CP-01

Geologist: T. BENNETT
Date : 12:28:98 17:46



Max. Depth: 75.13 (ft)

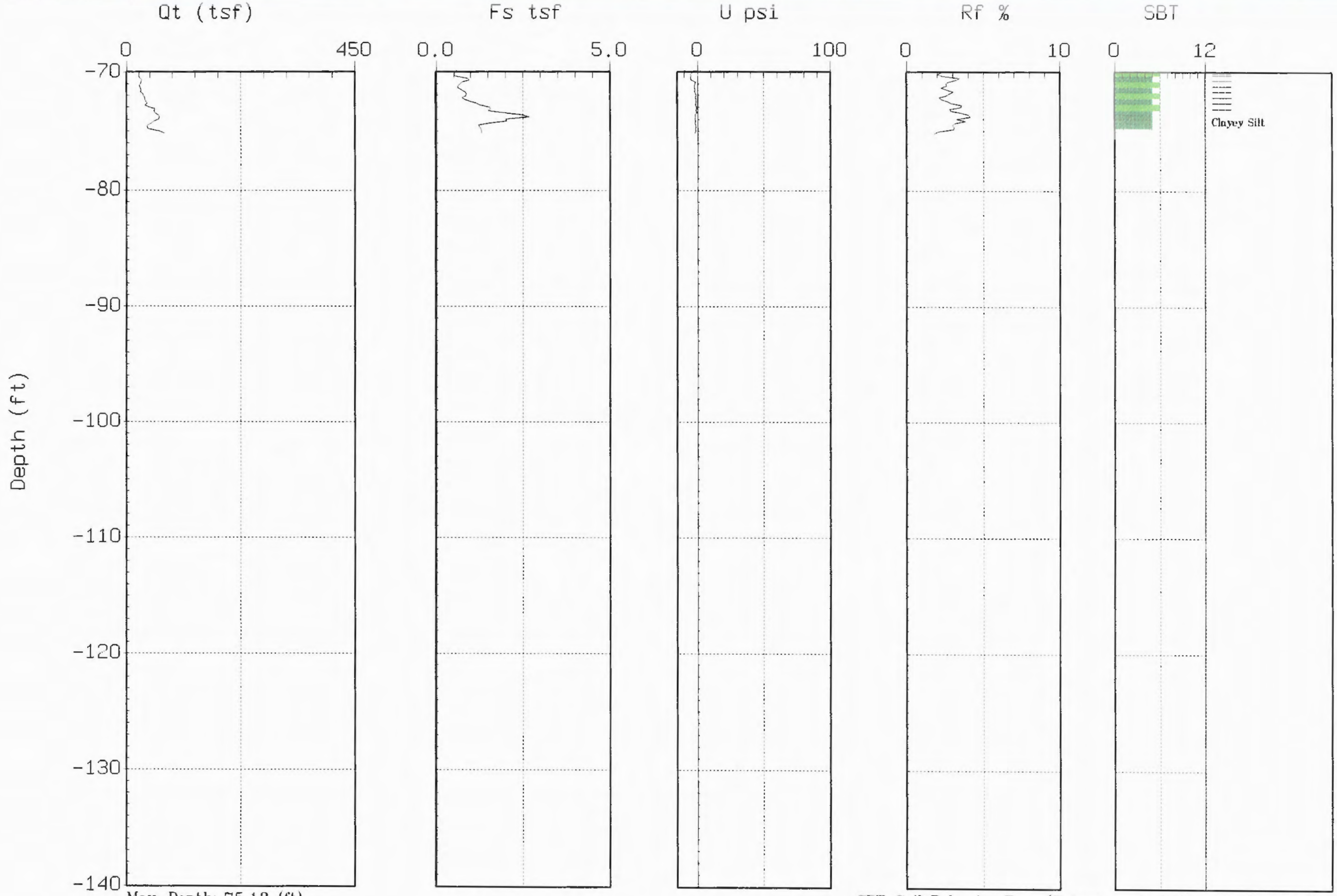
Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson and Campanella 1988)

LFR LEVINE.FRICKE

Site: 289 SAN JOSE YARD
Location : 289-CP-01

Geologist: T. BENNETT
Date : 12:28:98 17:46



Max. Depth: 75.13 (ft)

Depth Inc.: 0.164 (ft)

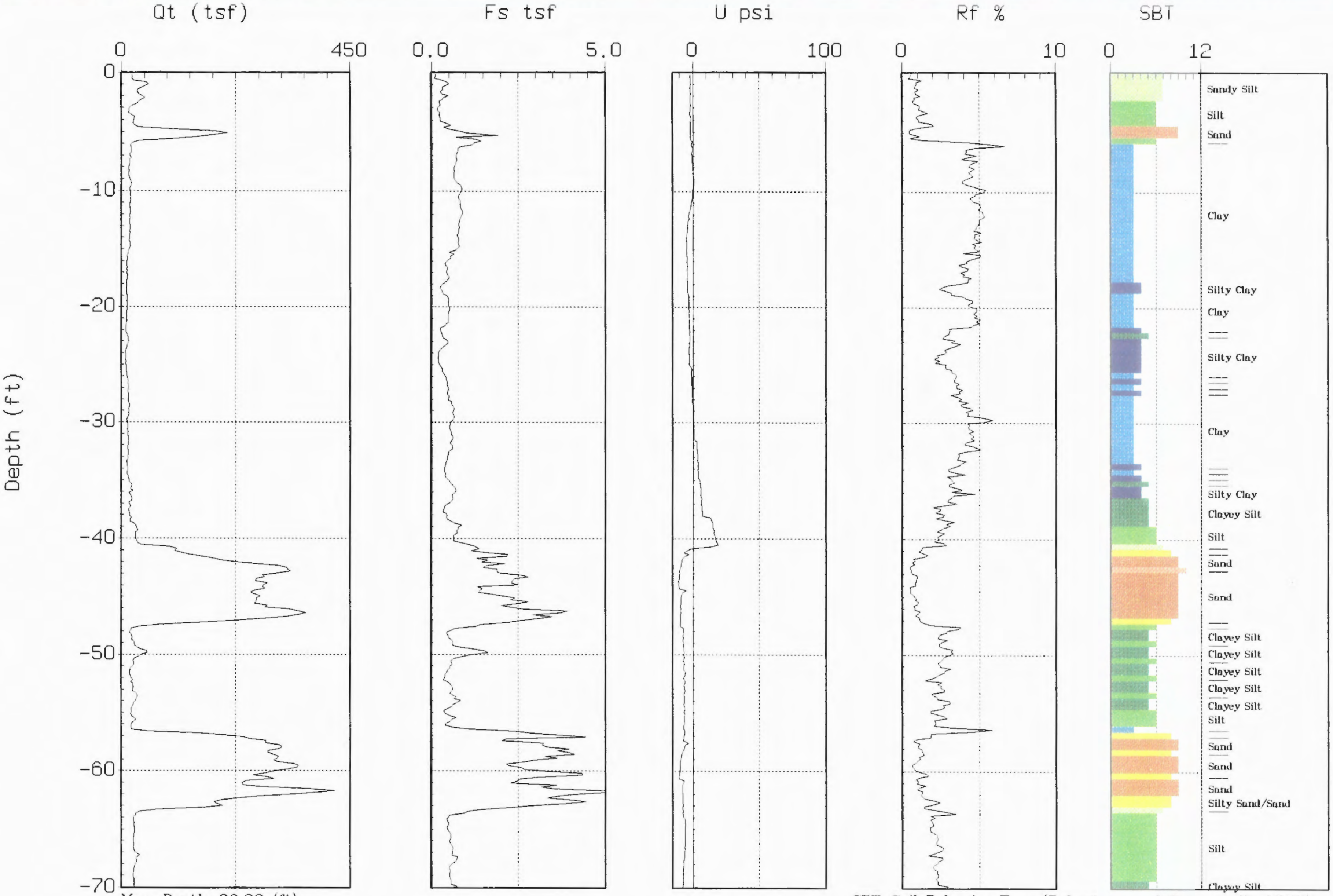
SBT: Soil Behavior Type (Robertson and Campanella 1988)

GREGG

LFR LEVINE.FRICKE

Site: 289 SAN JOSE YARD
Location : 289-CP-02

Geologist: T. BENNETT
Date : 12:28:98 19:11



Max. Depth: 80.22 (ft)

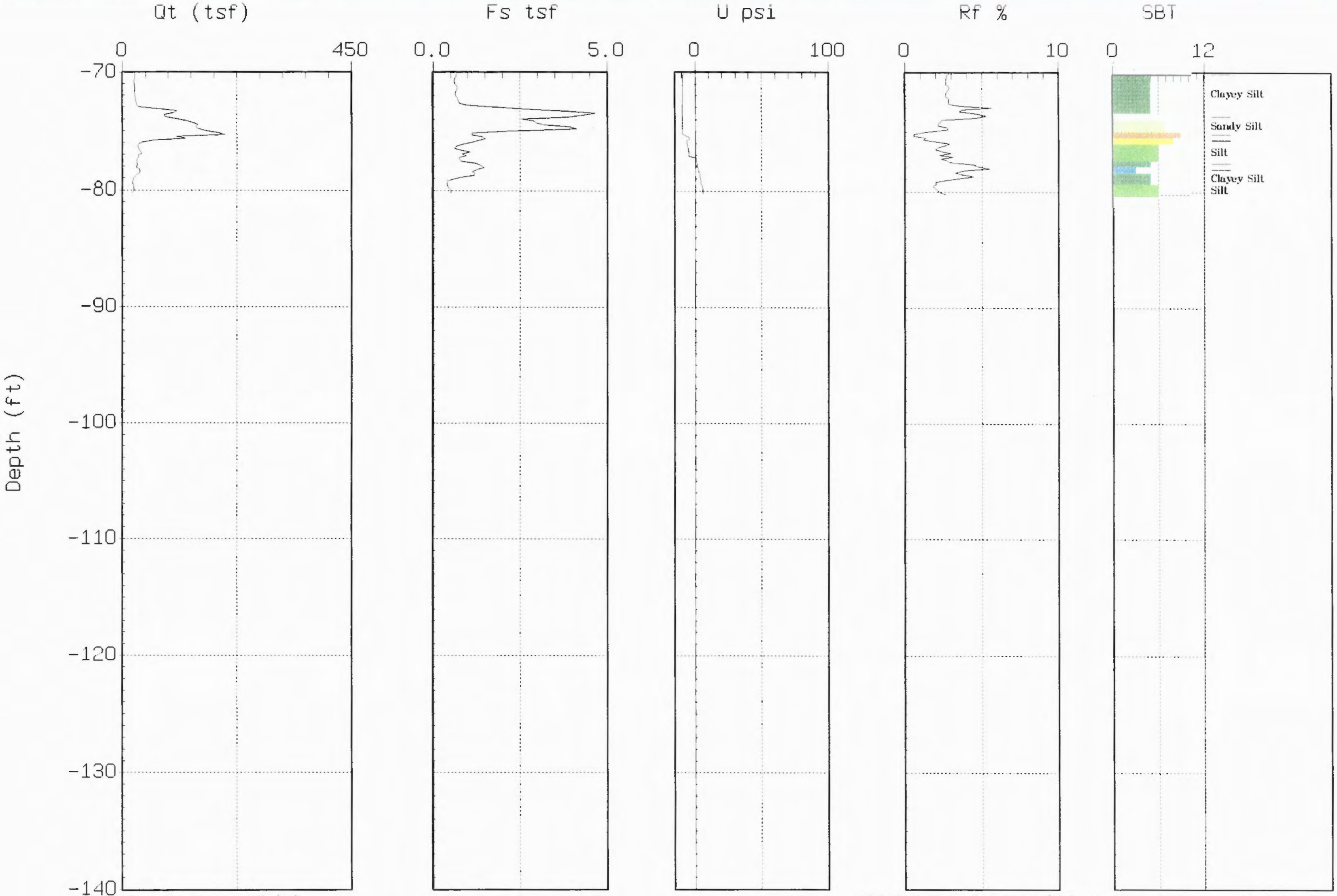
Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson and Campanella 1988)

LFR LEVINE.FRICKE

Site: 289 SAN JOSE YARD
Location : 289-CP-02

Geologist: T. BENNETT
Date : 12:28:98 19:11



Max. Depth: 80.22 (ft)

Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson and Campanella 1988)

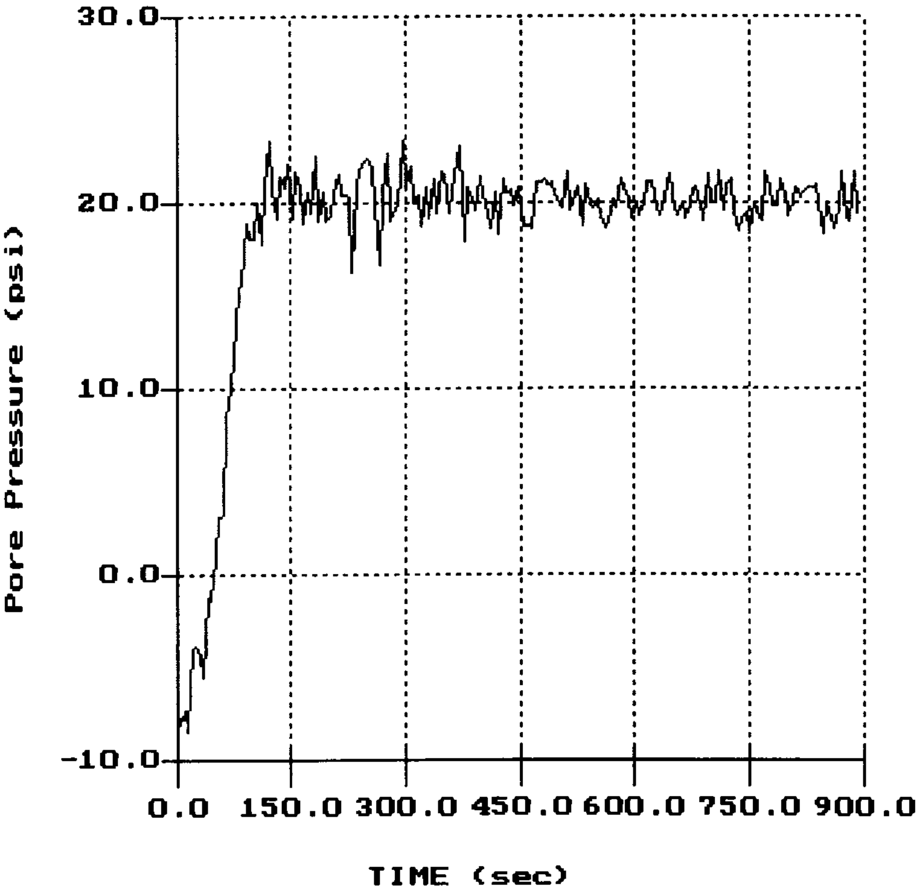
LFR LEVINE FRICKE

Hole:289-CP-01
Location:289 SJ YARD

Cone:20 TON AD071
Date:12:28:98 17:46

File: 14528901.PPR
Depth (m): 11.75
(ft): 38.55
Duration : 890.0s
U-min: -8.50 15.0s
U-max: 23.30 295.0s

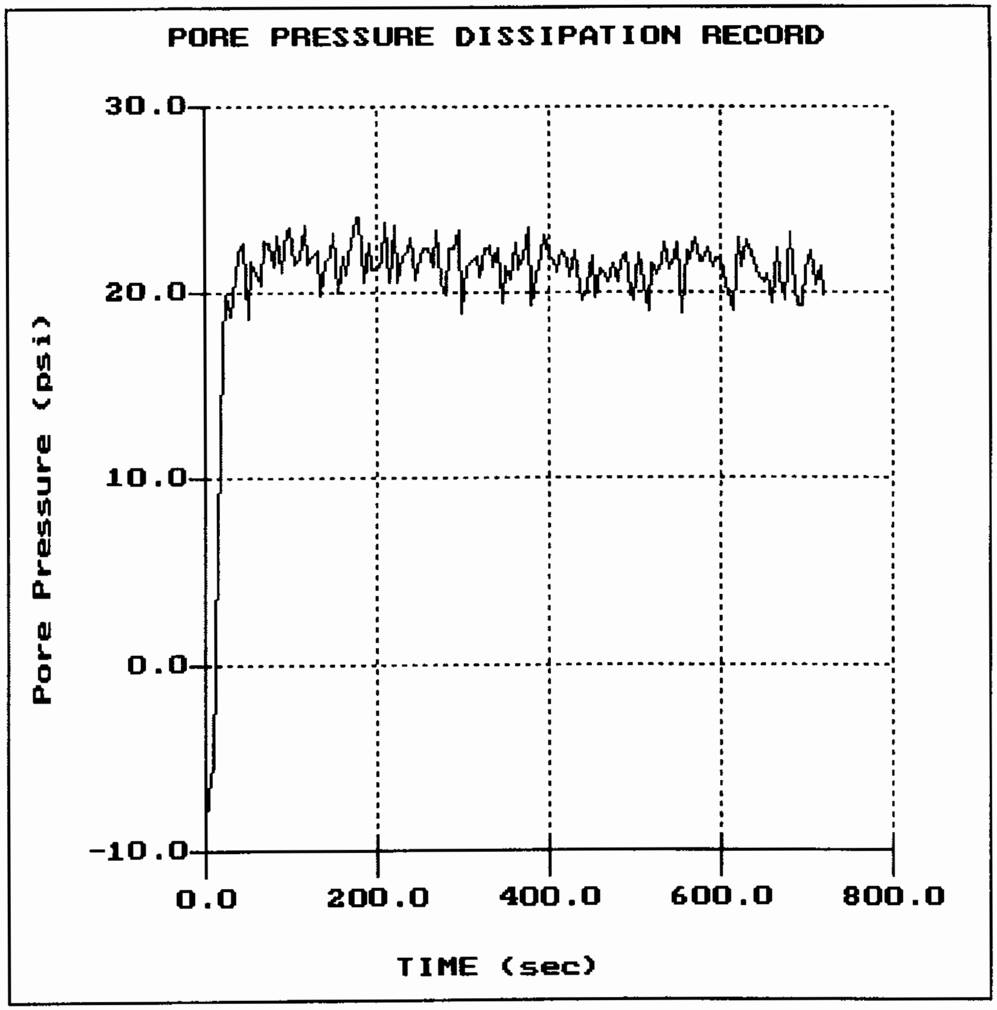
PORE PRESSURE DISSIPATION RECORD



LFR LEVINE FRICKE

Hole:289-CP-01
Location:289 SJ YARD

Cone:20 TON AD071
Date:12:28:98 17:46

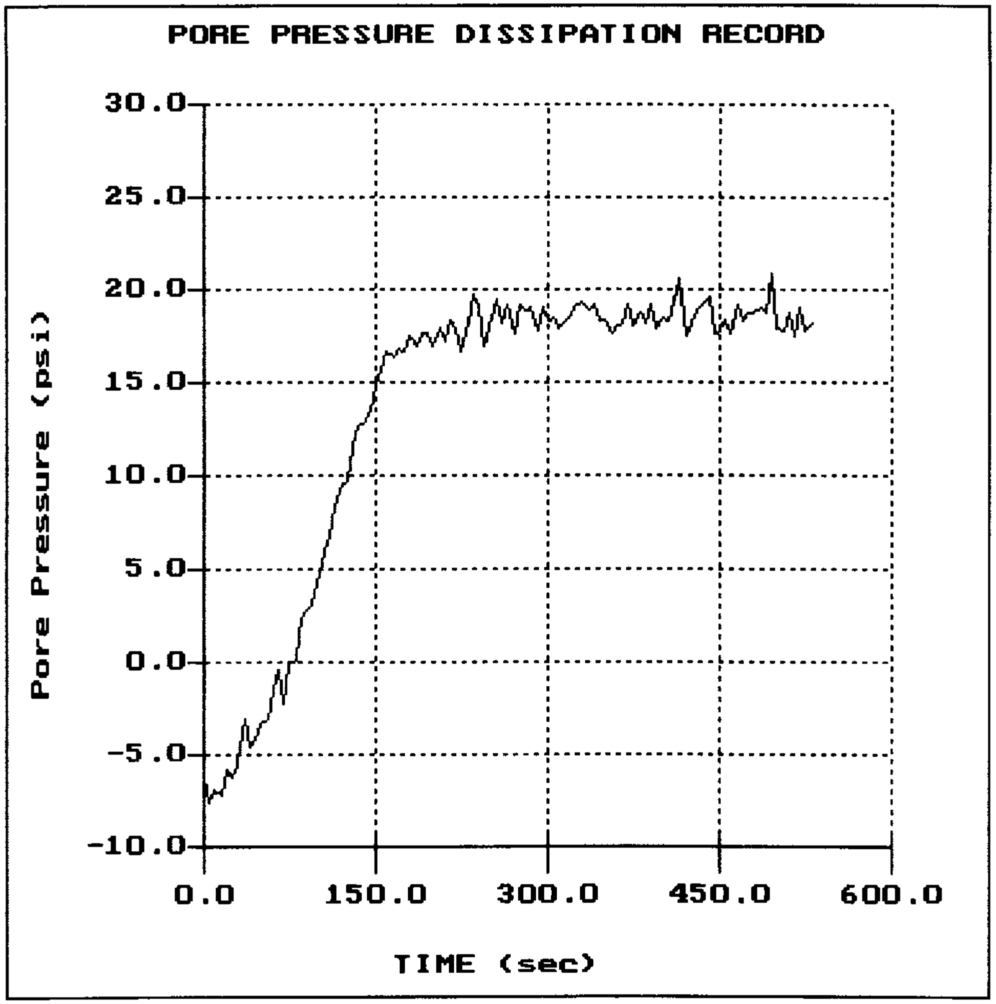


File: 14528901.PPR
Depth (m): 12.00
(ft): 39.37
Duration : 720.0s
U-min: -8.50 0.0s
U-max: 24.00 180.0s

LFR LEVINE FRICKE

Hole:289-CP-02
Location:289 SJ YARD

Cone:20 TON AD071
Date:12:28:98 19:11

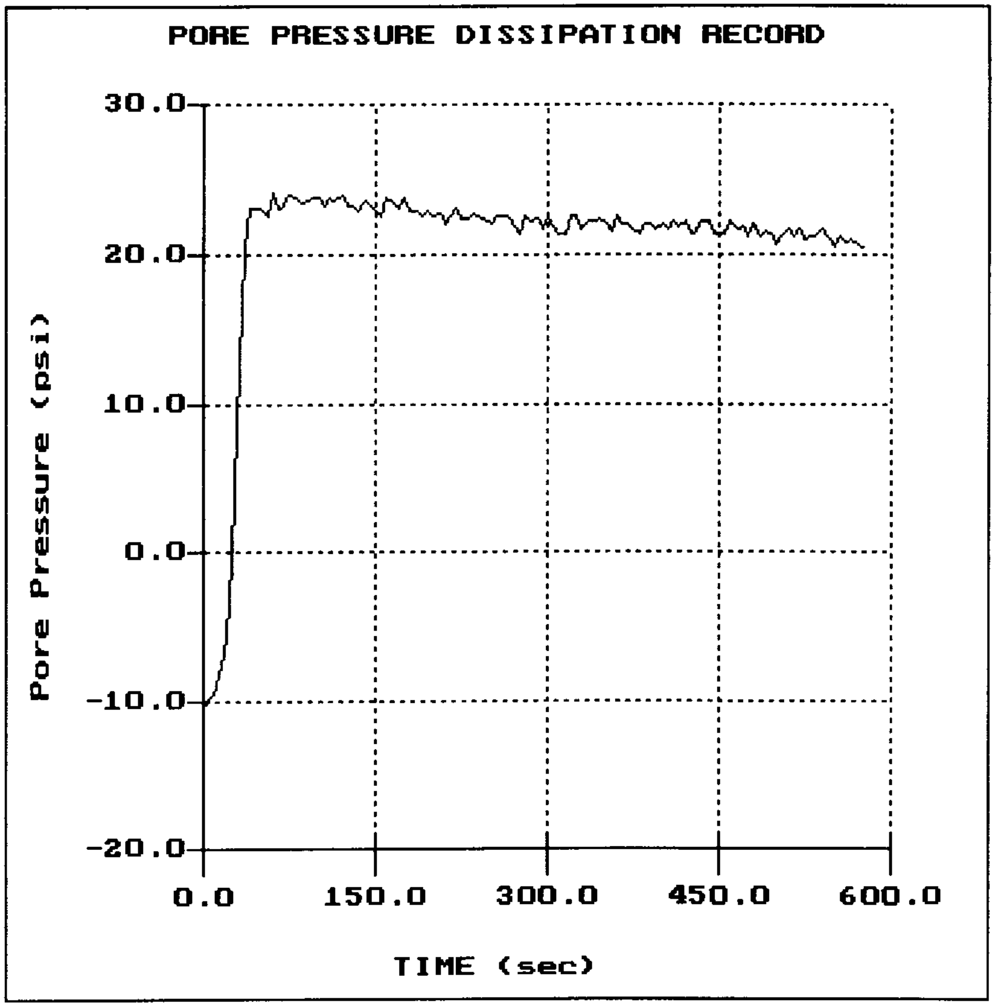

PORE PRESSURE DISSIPATION RECORD

File: 14528902.PPR
Depth (m): 12.55
(ft): 41.17
Duration : 530.0s
U-min: -7.60 5.0s
U-max: 20.90 495.0s

LFR LEVINE FRICKE

Hole:289-CP-02
Location:289 SJ YARD

Cone:20 TON AD071
Date:12:28:98 19:11



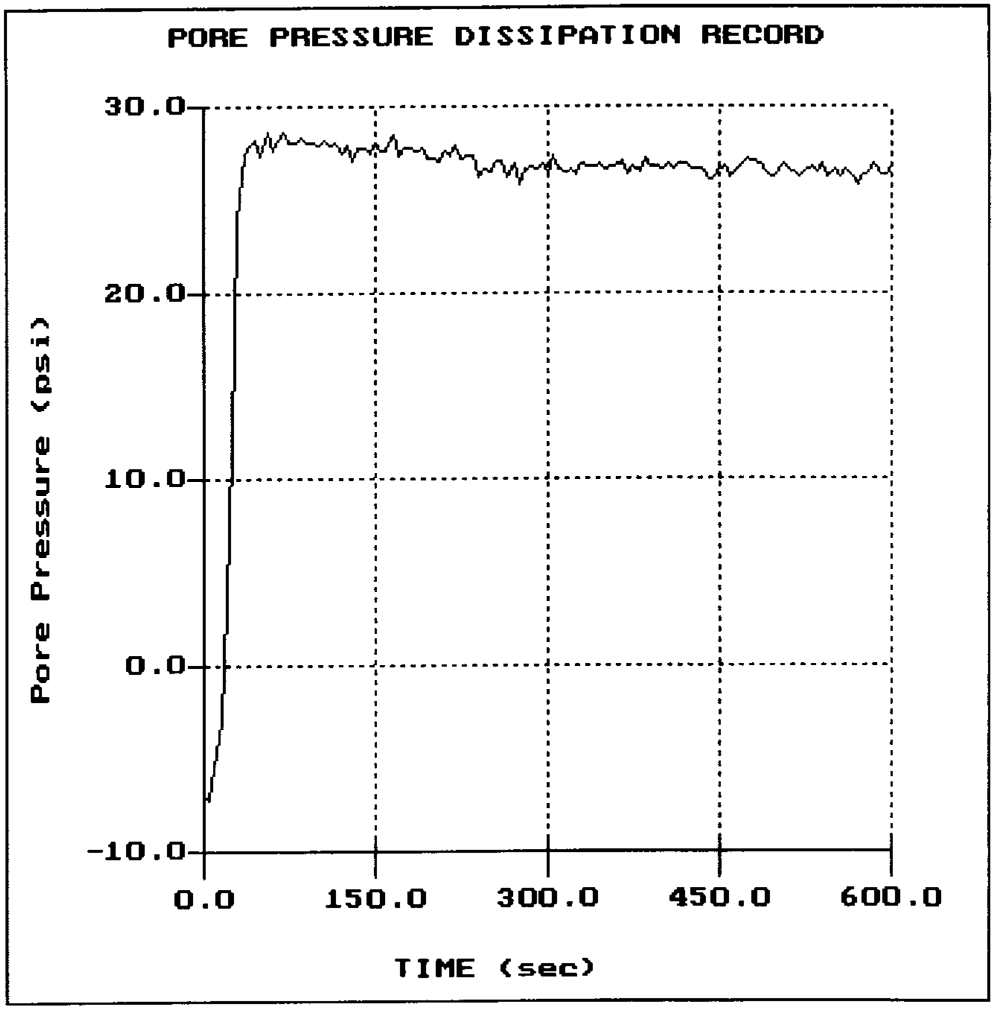
File: 14528902.PPR
Depth (m): 13.50
(ft): 44.29
Duration : 575.0s
U-min: -10.50 0.0s
U-max: 24.10 60.0s

LFR LEVINE FRICKE

Hole:289-CP-02
Location:289 SJ YARD

Cone:20 TON AD071
Date:12:28:98 19:11

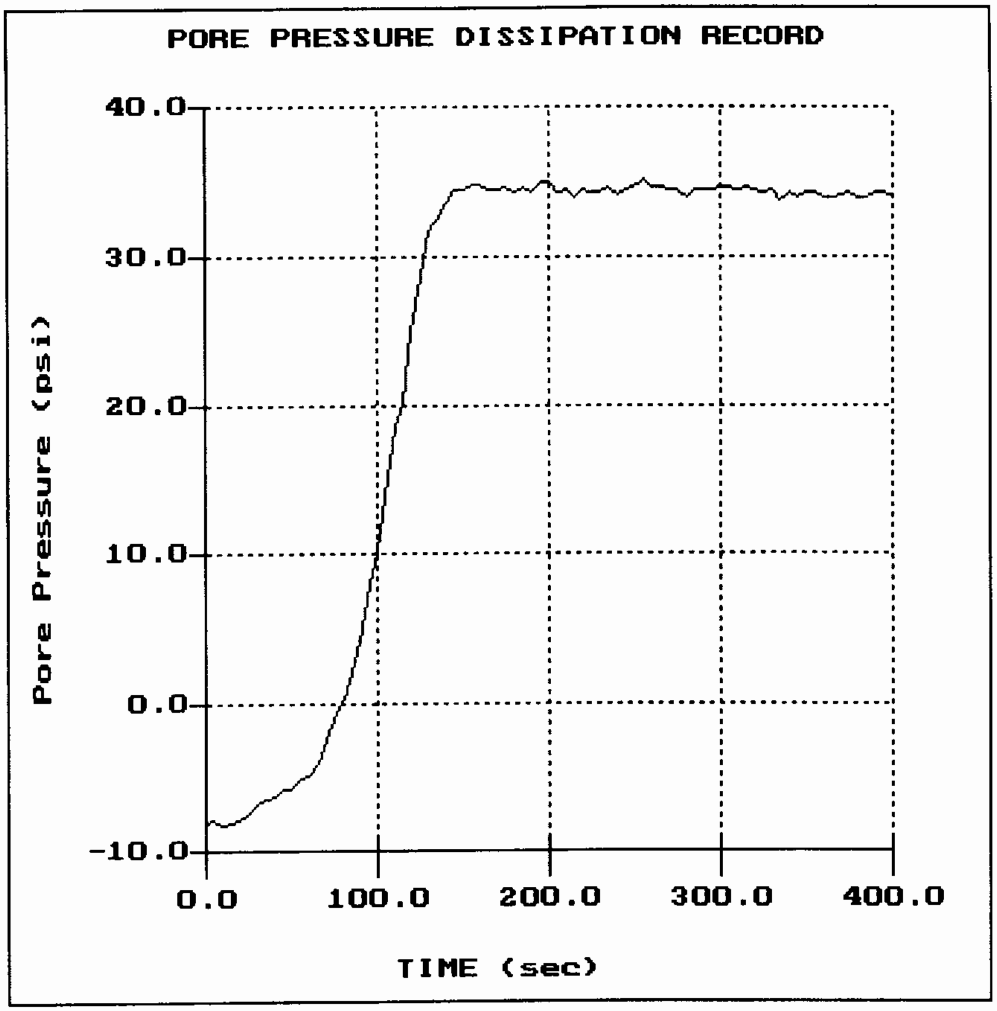
File: 14528902.PPR
Depth (m): 17.50
(ft): 57.41
Duration : 600.0s
U-min: -7.20 5.0s
U-max: 28.60 70.0s



LFR LEVINE FRICKE

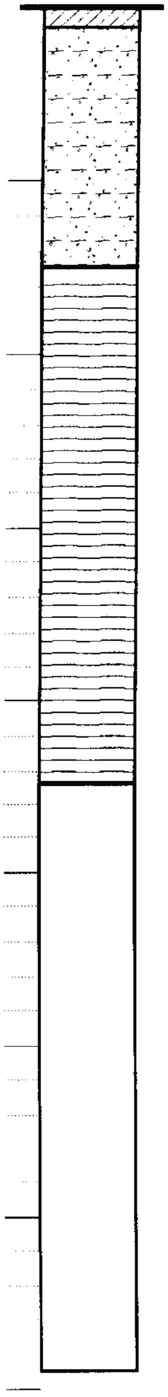
Hole:289-CP-02
Location:289 SJ YARD

Cone:20 TON AD071
Date:12:28:98 19:11

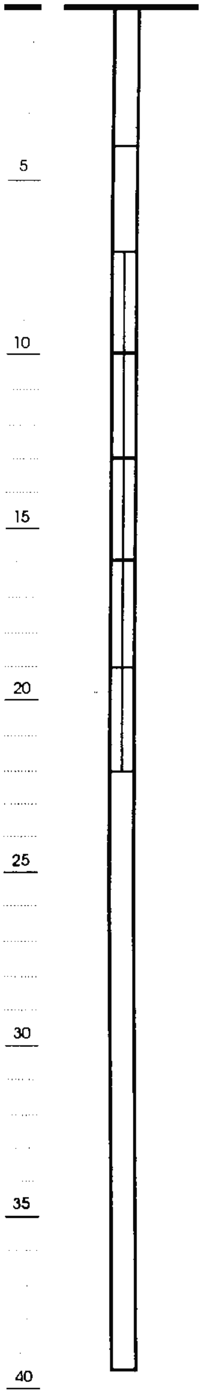


File: 14528902.PPR
Depth (m): 22.95
(ft): 75.30
Duration : 605.0s
U-min: -8.20 10.0s
U-max: 35.20 255.0s

SCVWD PILOT STUDY



Depth, feet	Water Level	PID Reading (ppm)	Lithologic Description
			ASPHALT.
5			
			SILTY GRAVELLY SAND (SM), brownish olive, moist, medium dense, well graded.
		0.0	CLAY (CL), brownish olive, mottled dark gray and olive-brown, slightly moist, very stiff, low plasticity, some round gravel, abundant vertical pores.
10			
		0.0	
15		0.0	CLAY (CL), mottled olive-brown and brownish gray, some light gray, moist, stiff, medium to high plasticity, rare plant material.
		0.0	Moist, very soft, medium to high plasticity.
20			
		0.0	CLAY (CL), mottled bluish gray and brownish olive, moist, medium stiff, medium to high plasticity, common organics-fine decayed roots, some vertical pores. Grades to very dark olive-gray.
25			No lithologic samples from 22 to 35.5 feet.
30			
35			
			BOTTOM OF BORING AT 39.5 FEET.
40			



Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: March 17, 1999
LFR Geologist: Todd Miller, R.G., CH.G.

EXPLANATION

- ▤ Clay
- ▤ Silt
- ▨ Sand
- ▨ Gravel

PID - Photoionization Detector

▼ Water level at time of drilling

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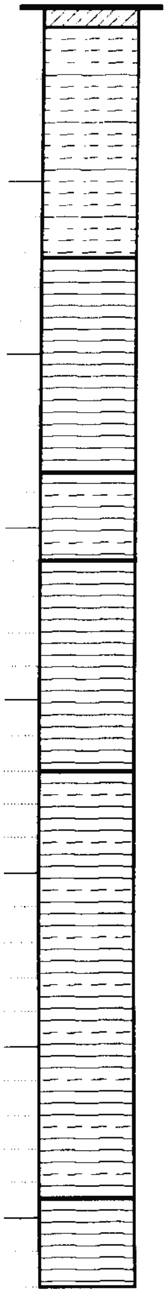
LITHOLOGY FOR 289-BH-01 *(page 1 of 1)*

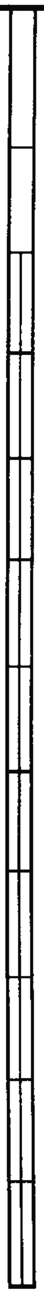
Project No. 6730.00-024

SCVWD PILOT STUDY



Depth, feet	Water Level	PID Reading (ppm)	Lithologic Description
			ASPHALT.
5			
			CLAYEY SANDY SILT (ML), grayish brown, moist, soft, 40% fine sand, some reddish brown veins, trace gravel.
			CLAY (CL), mottled olive-brown and gray, slightly moist, stiff, low plasticity.
		0.0	
10			
			Mottled yellowish brown and dark gray, very stiff.
		0.0	
			SILTY CLAY (CL), mottled olive-brown and olive-gray, moist, medium stiff, low plasticity, common minute vertical pores, rare oxidized rhizo spheres.
15		0.0	
			CLAY (CL), mottled bluish gray and olive, slightly moist, medium stiff, medium plasticity.
		0.0	
20			Moist, soft, medium to high plasticity.
		0.0	
		0.0	Very dark olive-gray, medium stiff. SILTY CLAY (CL), mottled dark olive-gray and olive-brown, slightly moist, medium stiff, low plasticity.
25			
		0.0	Mottled bluish gray and olive, moist, soft, high plasticity.
			Stiffer with depth.
30		0.0	
			SILTY CLAY (CL), mottled dark gray and olive-brown, slightly moist, soft, high plasticity.
		0.0	
35		0.0	CLAY (CL), mottled bluish gray and olive-gray, moist, soft to medium stiff, high plasticity, common organics-fine decayed roots.
			BOTTOM OF BORING AT 37 FEET.
40			

Sample Interval



Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: March 17, 1999
LFR Geologist: Todd Miller, R.G., CH.G.

EXPLANATION

▤	Clay
▭	Silt
░	Sand
▒	Gravel

PID - Photoionization Detector

▼ Water level at time of drilling

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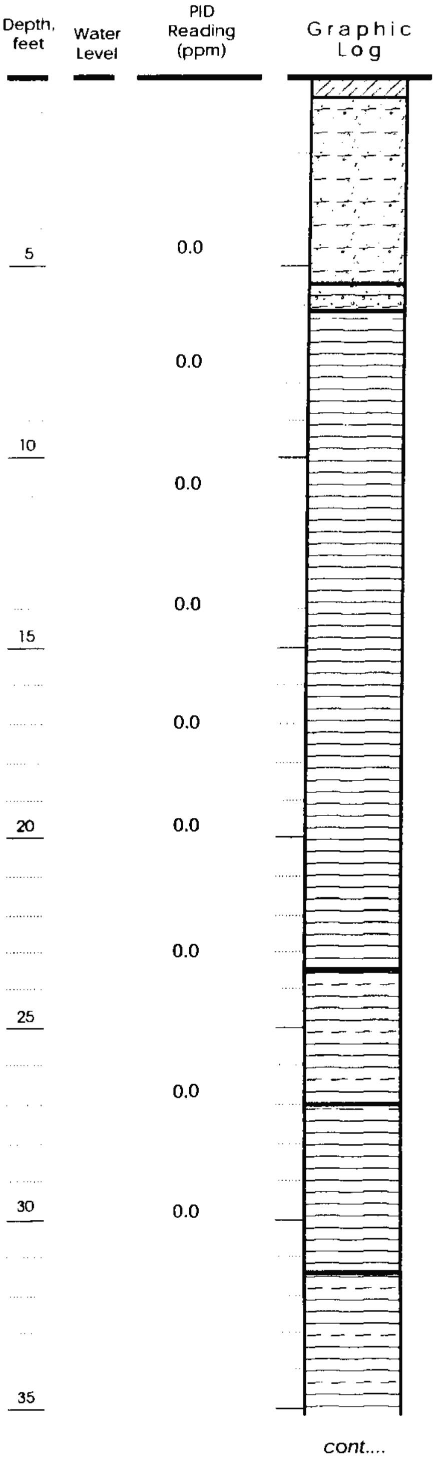
LITHOLOGY FOR 289-BH-02 *(page 1 of 1)*

Project No. 6730.00-024

SCVWD PILOT STUDY

Depth, feet | Water Level | PID Reading (ppm) | Graphic Log | Lithologic Description | Sample Interval



ASPHALT.

SILTY GRAVELLY SAND (SM), dark grayish brown, moist, loose, medium/fine grained.

GRAVELLY CLAYEY SILT (ML), grayish brown, moist, very soft.

CLAY (CL), mottled olive-brown and yellowish brown and gray, slightly moist, very stiff, low plasticity.

Moist to slightly moist, medium stiff to soft.

CLAY (CL), mottled olive-brown and olive and bluish gray, moist, soft, high plasticity, rare plant material in some very soft dark gray portions.

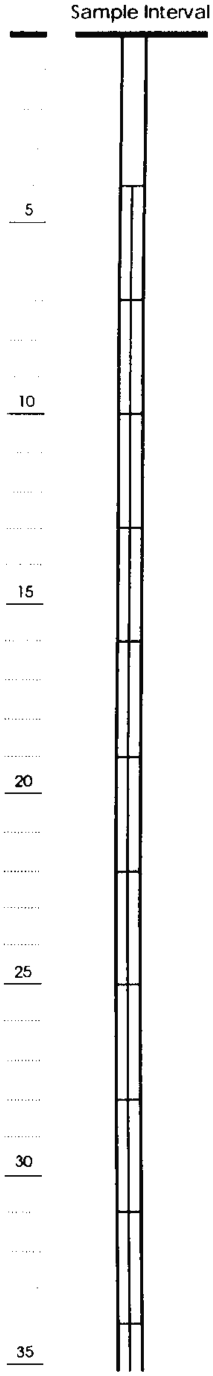
Mottled bluish gray and olive, slightly moist, medium stiff, medium to high plasticity.

SILTY CLAY (CL), mottled dark olive-gray and olive, slightly moist, medium stiff, medium plasticity, trace gravel, grades to

CLAY (CL), mottled dark olive-gray and dark olive, slightly moist, stiff, low plasticity, grades to

Mottled olive and bluish gray, some yellowish brown and pale gray, moist, medium stiff, medium plasticity.

SILTY CLAY (CL), mottled olive-brown and gray and yellowish brown, moist, soft to medium stiff, low plasticity.



EXPLANATION

▤	Clay
▤	Silt
░	Sand
░	Gravel

PID - Photoionization Detector

▼ Water level at time of drilling

Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: March 17, 1999
LFR Geologist: Todd Miller, R.G., CH.G.

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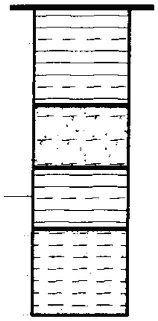
LITHOLOGY FOR 289-BH-03 *(page 1 of 2)*

Project No. 6730.00-024

SCVWD PILOT STUDY



Depth, feet	Water Level	PID Reading (ppm)	Lithologic Description	Sample Interval
			Grades to SILTY CLAY (CL), mottled dark bluish gray and olive, moist, soft to medium stiff, low plasticity, common decayed roots.	
		0.0	GRAVELLY SILTY SAND (SM), dark gray, very moist to wet, dense, fine gravel, subangular gravel to 0.5 centimeter, subround.	
40			SILTY CLAY (CL), dark gray, moist, soft, medium plasticity.	40
		0.0	SANDY SILT with CLAY (ML), wet, very fine-grained sand.	
			BOTTOM OF BORING AT 43 FEET.	
45				45
50				50
55				55
60				60
65				65
70				70

Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: March 17, 1999
LFR Geologist: Todd Miller, R.G., CH.G.

EXPLANATION

▤ Clay
┅ Silt
░ Sand
▒ Gravel

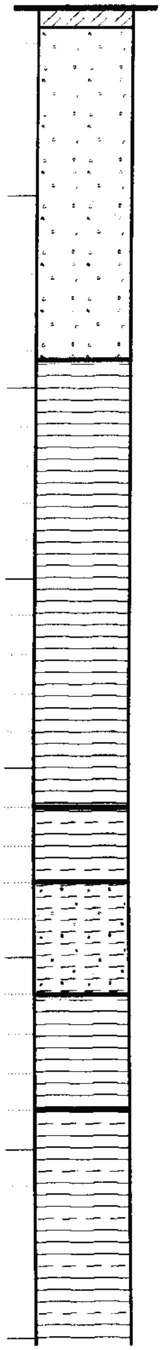
PID - Photoionization Detector

▼ Water level at time of drilling

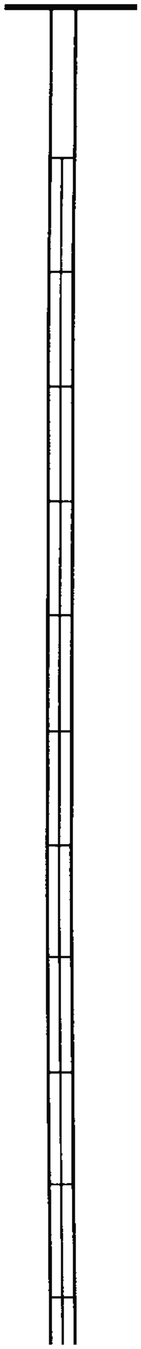
SCVWD PILOT STUDY

Depth, feet	Water Level	PID Reading (ppm)	Lithologic Description
			ASPHALT.
			Gravelly Sand (Fill).
5			No recovery.
			Poor recovery. GRAVELLY SAND (SP), dark yellowish brown, moist, very loose, fine-grained, subround gravel, clasts less than 1 centimeter.
		0.0	
10			CLAY (CL), mottled olive-brown and gray, moist, medium stiff, medium plasticity, common vertical pores and fibrous root materials.
		0.0	
15		0.0	
			Soft, high plasticity.
		0.0	
20			
		0.0	
			SILTY CLAY (CL), very dark gray, moist, soft, high plasticity, trace coarse angular gravel.
	▼ ATD	0.0	
			GRAVELLY SANDY SILT (ML), olive and bluish gray, moist, medium stiff, low plasticity, fine-grained sand.
25			
			CLAY (CL), dark gray and olive, moist, soft, medium to high plasticity, some fibrous roots.
		0.0	
			SILTY CLAY (CL), olive and gray, mottled, slightly moist, medium stiff to soft, high plasticity.
30		0.0	
			Olive-brown and gray, moist.
		0.0	
			Very moist, very soft, very high plasticity.
35			

Graphic Log



Sample Interval



cont....

Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: March 18, 1999
LFR Geologist: Todd Miller, R.G., CH.G.

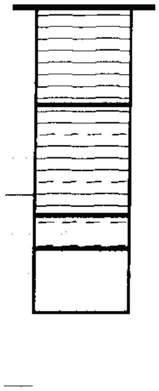
EXPLANATION

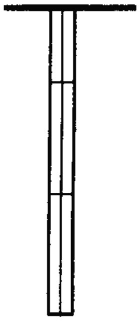
☰	Clay
⚋	Silt
⠒	Sand
⁘	Gravel

PID - Photoionization Detector

▼ Water level at time of drilling

SCVWD PILOT STUDY





Depth, feet	Water Level	PID Reading (ppm)	Lithologic Description	Depth, feet
		0.0	CLAY (CL), bluish gray mottled with olive-brown, slightly moist, very stiff, medium plasticity.	
		0.0	SILTY CLAY (CL) as above, very moist, some fine sand.	
40				40
			SILTY SAND (SM), yellowish brown, wet, very fine grained. SAND (SP), olive-brown, very moist, very dense, uniform, medium-grained sand, with fine gravel. BOTTOM OF BORING AT 43 FEET.	
45				45
50				50
55				55
60				60
65				65
70				70

Sample Interval

Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: March 18, 1999
LFR Geologist: Todd Miller, R.G., CH.G.

EXPLANATION

▤ Clay

▭ Silt

□ Sand

▨ Gravel

PID - Photoionization Detector

▼ Water level at time of drilling

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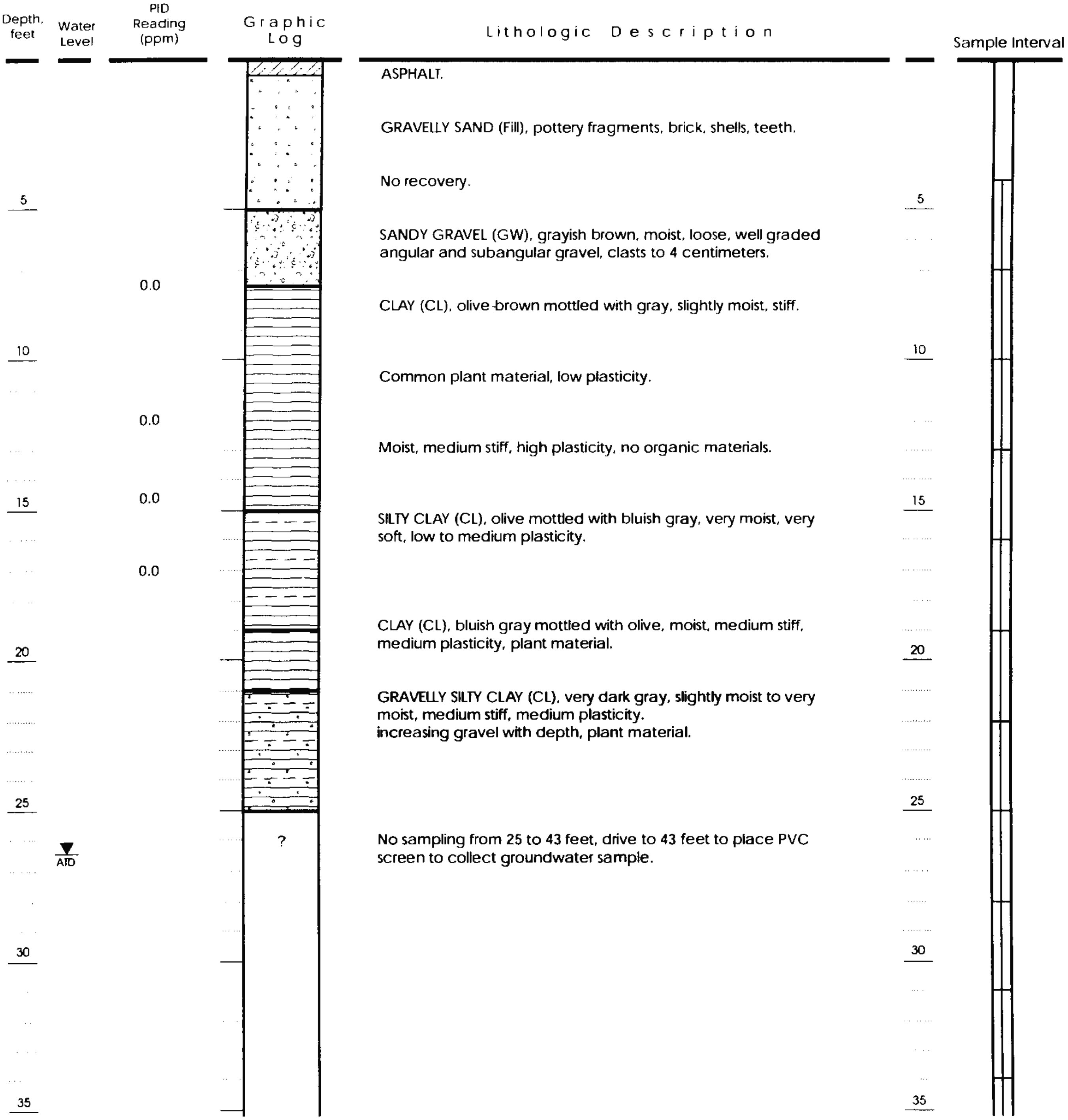
LITHOLOGY FOR 289-BH-04 *(page 2 of 2)*

Project No. 6730.00-024

SCVWD PILOT STUDY



ASPHALT.

GRAVELLY SAND (Fill), pottery fragments, brick, shells, teeth.

No recovery.

SANDY GRAVEL (GW), grayish brown, moist, loose, well graded angular and subangular gravel, clasts to 4 centimeters.

CLAY (CL), olive-brown mottled with gray, slightly moist, stiff.

Common plant material, low plasticity.

Moist, medium stiff, high plasticity, no organic materials.

SILTY CLAY (CL), olive mottled with bluish gray, very moist, very soft, low to medium plasticity.

CLAY (CL), bluish gray mottled with olive, moist, medium stiff, medium plasticity, plant material.

GRAVELLY SILTY CLAY (CL), very dark gray, slightly moist to very moist, medium stiff, medium plasticity.
increasing gravel with depth, plant material.

No sampling from 25 to 43 feet, drive to 43 feet to place PVC screen to collect groundwater sample.

cont....

Drilling Method:	Dual-Tube/Direct Push
Drilling Company:	Precision
Date Well Drilled:	March 18, 1999
LFR Geologist:	Todd Miller, R.G., CH.G.

EXPLANATION

- ☰ Clay
- ▭ Silt
- ▨ Sand
- ▩ Gravel

PID - Photoionization Detector

▼ Water level at time of drilling

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LITHOLOGY FOR 289-BH-05 *(page 1 of 2)*

Project No. 6730.00-024

SCVWD PILOT STUDY

Depth, feet	Water Level	PID Reading (ppm)	Graphic Log	Lithologic Description		Sample Interval
40					40	
				BOTTOM OF BORING AT 43 FEET.		
45					45	
50					50	
55					55	
60					60	
65					65	
70					70	

Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: March 18, 1999
LFR Geologist: Todd Miller, R.G., CH.G.

EXPLANATION

▤	Clay
▭	Silt
▒	Sand
▓	Gravel

PID -Photoionization Detector

▼ Water level at time of drilling

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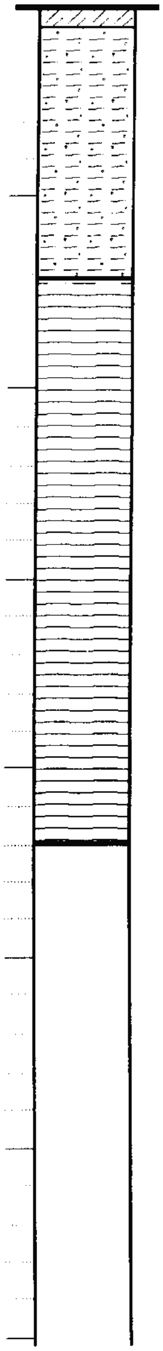
LITHOLOGY FOR 289-BH-05 *(page 2 of 2)*

Project No. 6730.00-024

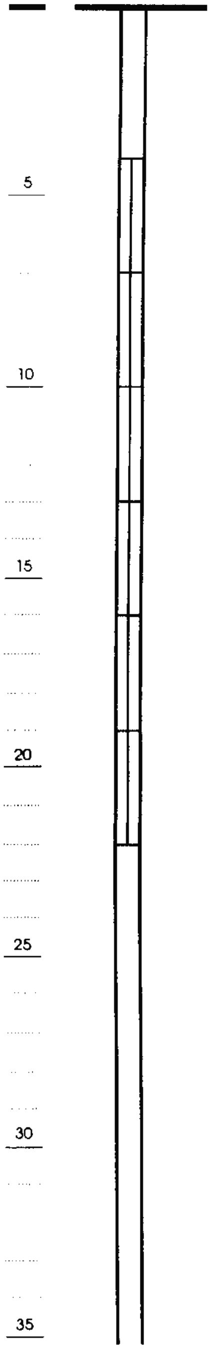
SCVWD PILOT STUDY

Depth, feet	Water Level	PID Reading (ppm)	Lithologic Description
			ASPHALT.
5			
		0.0	GRAVELLY SANDY SILT (ML), dark brown, slightly moist, stiff, low plasticity, fine-grained sand, coarse gravel.
		0.0	CLAY (CL), olive-brown mottled with gray, slightly moist, very stiff, medium to low plasticity.
10			
		0.0	
15		0.0	Moist, medium to high plasticity.
		0.0	
			CLAY (CL), bluish gray mottled with olive-brown, moist, soft, medium to high plasticity, some silt, trace fine gravel, plant material.
20		0.0	CLAY (CL), bluish gray mottled with olive, moist, soft, high plasticity.
25			
			No sampling from 22 to 43 feet, drive to 52 feet to collect water samples..
30			
35			

Graphic Log



Sample Interval



cont....

Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: March 18, 1999
LFR Geologist: Todd Miller, R.G., CH.G.

EXPLANATION

- ▤ Clay
- ▥ Silt
- ░ Sand
- ▒ Gravel

PID - Photoionization Detector

▼ Water level at time of drilling

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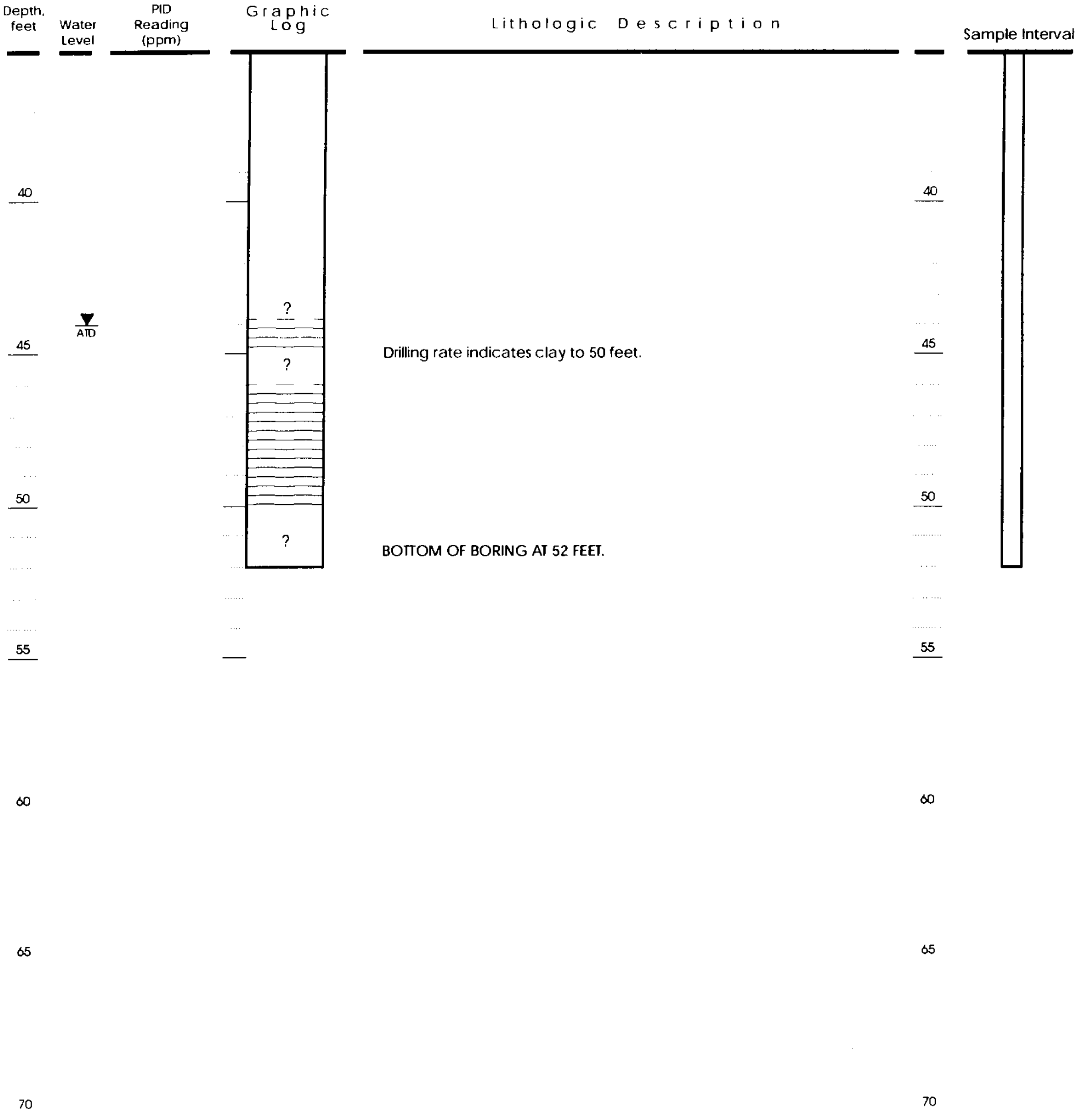
LITHOLOGY FOR 289-BH-06 *(page 1 of 2)*

Project No. 6730.00-024

SCVWD PILOT STUDY



Drilling rate indicates clay to 50 feet.

BOTTOM OF BORING AT 52 FEET.

Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: March 18, 1999
LFR Geologist: Todd Miller, R.G., CH.G.

EXPLANATION

▤ Clay
▤ Silt
▨ Sand
▨ Gravel

PID - Photoionization Detector

▼ Water level at time of drilling

SANTA CLARA VALLEY WATER DISTRICT

Pilot Study of Operating Underground Storage Tanks

Santa Clara County, California

Site Report

SITE NUMBER 332

Beacon #1-722
1190 W 1st Street
Gilroy, California 95020

June 4, 1999

This Site Report is one of a series of reports prepared for the Santa Clara Valley Water District's Pilot Study of Operating Underground Storage Tanks. The District funded this study to assess if MtBE is being released from UST systems that meet 1998 federal- and state-mandated upgrade requirements. The District will use the results of the Pilot Study, and possibly information obtained during subsequent investigations, to evaluate whether up-graded UST systems that handle MtBE are protective of groundwater quality, and ultimately drinking water. This Study and other District groundwater vulnerability assessments are critical in formulating a plan to protect drinking water supplies into the future.

With assistance from the Gilroy Fire Department, LFR Levine·Fricke completed a file review and conducted soil and groundwater sampling adjacent to this site on behalf of the District. This report provides a brief summary of investigation findings, and site-specific data in tables, figures, and appendices. This Site Report is appended to the Summary Report for the Study.

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Emeryville, California 94608-1827
(510) 652-4500/Fax (510) 652-2246

SUMMARY OF FINDINGS

SITE DESCRIPTION

Figure 1 illustrates the site location. Sediments encountered during drilling adjacent to the Site consisted of interbedded silts, clays, gravels and sands to approximately 40 feet below the ground surface (bgs). The shallowest depth to groundwater measured was approximately 35 feet bgs.

SYSTEM DESCRIPTION

Records indicate that the UST system at the site consists of three 10,000-gallon double-walled gasoline USTs constructed of fiberglass, fiberglass reinforced plastic exterior corrosion protection, and double-walled fiberglass piping. The UST system utilizes continuous interstitial monitoring for both piping and UST leak detection as well as manual inventory reconciliation and automatic tank gauging for UST leak detection. Field observations indicate the UST system utilizes a balanced vapor recovery system.

RESULTS

Fifteen soil samples and 7 groundwater samples were collected from borings drilled adjacent to the Site. MtBE was detected in 6 of the 15 soil samples, and 7 of the 7 groundwater samples. MtBE concentrations in the soil samples ranged from 21 μg/kg to 1800 μg/kg. MtBE concentrations in the groundwater samples ranged from 3.3 μg/l to 26,000 μg/l. With the exception of xylene, which was detected in one of the soil samples at a concentration of 6.7 μg/kg, no other petroleum hydrocarbon constituents (benzene, toluene, and/or ethylbenzene) were detected in the soil samples. TPH as gasoline was detected in 3 of the 7 groundwater samples at concentrations ranging from 0.53 mg/l to 4.6 mg/l.

SITE SELECTION CRITERIA MET

1998 upgrade compliant?	Yes
On SCVWD fuel leak database?	No
Status:	Not Applicable
Distance from LUST site:	Greater than 250 feet
Distance to water supply well:	Less than 2000 feet
Access granted?	No
SCVWD approved?	Yes

FILE REVIEW SUMMARY

Number of tanks:	3
Reported release?	Yes, see Comments below
Release date:	Not applicable
Fuel released:	Not applicable
Location:	Not applicable
Quantity (gallons):	Not applicable
Data available:	Not applicable

Comments:

Petroleum constituents found in soil at time of removal of old USTs in 1988. TPH-G found at concentrations up to 17 ppm; benzene found at concentrations of up to 0.034 ppm. Excavated soils from UST pit were removed from site and disposed of offsite. Tank upgrade cetificate issued December 1998, after installation of overfill protection in November 1998.

SITE VISIT - UST SYSTEM INFORMATION

UST system inspection not conducted for off-site investigations.

SITE INSPECTION

Site inspection not conducted for off-site investigations.

UST SYSTEM DATA FROM FORM B COLLECTED DURING FILE REVIEWS - TANK ID # 722-1

Date installed:	1988
Tank capacity (gallons):	10,000
Tank contents:	Regular unleaded
Tank construction:	
Type of system:	Double wall
Tank material (primary tank):	Fiberglass
Lining compatible with 100% methanol:	No
Exterior corrosion protection:	Fiberglass reinforced plastic
Date spill containment installed:	1988
Date overfill protection equipment installed:	1998
Drop tube:	Not noted
Striker plate:	Not noted
Dispenser containment:	Not noted
Piping information:	
System type:	Pressure, underground
Construction:	
Material and corrosion protection:	Fiberglass pipe, underground
Leak detection:	Continuous interstitial monitoring
Tank leak detection?	Manual inventory reconciliation Automatic tank gauging Continuous interstitial monitoring

UST SYSTEM DATA FROM FORM B COLLECTED DURING FILE REVIEWS - TANK ID # 722-2

Date installed:	1988
Tank capacity (gallons):	10,000
Tank contents:	Premium unleaded
Tank construction:	
Type of system:	Double wall
Tank material (primary tank):	Fiberglass

Lining compatible with 100% methanol:	No
Exterior corrosion protection:	Fiberglass reinforced plastic
Date spill containment installed:	1988
Date overfill protection equipment installed:	1998
Drop tube:	Not noted
Striker plate:	Not noted
Dispenser containment:	Not noted
Piping information:	
System type:	Pressure, underground
Construction:	Double wall, underground
Material and corrosion protection:	Fiberglass pipe, underground
Leak detection:	Continuous interstitial monitoring
Tank leak detection?	Manual inventory reconciliation Automatic tank gauging Continuous interstitial monitoring

UST SYSTEM DATA FROM FORM B COLLECTED DURING FILE REVIEWS - TANK ID # 722-3

Date installed:	1988
Tank capacity (gallons):	10,000
Tank contents:	Midgrade unleaded
Tank construction:	
Type of system:	Double wall
Tank material (primary tank):	Fiberglass
Lining compatible with 100% methanol:	No
Exterior corrosion protection:	Fiberglass reinforced plastic
Date spill containment installed:	1988
Date overfill protection equipment installed:	1998
Drop tube:	Not noted
Striker plate:	Not noted
Dispenser containment:	Not noted
Piping information:	
System type:	Pressure, underground
Construction:	Double wall, underground
Material and corrosion protection:	Fiberglass pipe, underground
Leak detection:	Continuous interstitial monitoring
Tank leak detection?	Manual inventory reconciliation Automatic tank gauging Continuous interstitial monitoring

Table 1

Summary of Chemical Analysis Results for Soil Samples - Site #332

Santa Clara Valley Water District

	Date Sampled	Depth (ft bgs)	Methyl Tertiary Butyl Ether (MTBE) ug/Kg	TPH as Gasoline (TPHg) mg/Kg	Benzene (B) ug/Kg	Toluene (T) ug/Kg	Ethyl Benzene (E) ug/Kg	meta/para-Xylenes (m/p-X) ug/Kg	ortho-Xylene (o-X) ug/Kg	Di-isopropyl Ether (DIPE) ug/Kg	Ethyl Tertiary Butyl Ether (ETBE) ug/Kg	Tertiary Amyl Methyl Ether (TAME) ug/Kg	Tertiary Butyl Alcohol (TBA) ug/Kg
332-BH-01	03/24/99	6.5-7.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		16.5-17.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
	03/26/99	27.5-28.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
332-BH-02	03/25/99	10.5-11.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		16.5-17.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		35.0-35.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
332-BH-03	03/25/99	6.0-6.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		15.5-16.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		35.5-36.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
332-BH-04	03/26/99	16.0-16.5	370	<1	<5	<5	<5	6.7	<5	<20	<20	<20	<200
		28.0-28.5	1800	<1	<5	<5	<5	<5	<5	<20	<20	<20	1100
		36.0-36.5	880	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
332-BH-05	03/26/99	16.0-16.5	21	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		23.0-23.5	220	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		36.0-36.5	96	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200

Table proofed by CLC.

Notes:

All samples were analyzed by Alpha Analytical, Inc. of Sparks, NV, using EPA Method 8260 for MTBE, BTEX, DIPE, ETBE, TAME, and TBA, and Modified EPA Method 8015 for TPHg.

ft bgs = feet below ground surface

mg/Kg = milligrams per kilogram

TPH = total petroleum hydrocarbons

ug/Kg = micrograms per kilogram

Data Qualifiers (if shown on table):

J = Estimated value

UJ =Not detected at the estimated reporting limit shown

Table 2
Summary of Chemical Analysis Results for Groundwater Samples - Site # 332
Santa Clara Valley Water District

Location	Date Sampled	Depth (ft bgs)	Methyl Tertiary Butyl Ether (MTBE) ug/L	TPH as Gasoline (TPHg) mg/L	Benzene (B) ug/L	Toluene (T) ug/L	Ethyl Benzene (E) ug/L	meta/para-Xylenes (m/p-X) ug/L	ortho-Xylene (o-X) ug/L	Di-isopropyl Ether (DIPE) ug/L	Ethyl Tertiary Butyl Ether (ETBE) ug/L	Tertiary Amyl Methyl Ether (TAME) ug/L	Tertiary Butyl Alcohol (TBA) ug/L
332-BH-01	03/26/99	34.5-40.0	3.3	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<10
332-BH-01-DUP		34.5-40.0	3.6	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<10
332-BH-02	03/25/99	33.0-40.0	2900	0.53	<1	<1	<1	<1	<1	<2	<2	8.1	<20
332-BH-03	03/25/99	34.0-36.5	5	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<10
332-BH-03-DUP		34.0-36.5	5	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<10
332-BH-04	03/26/99	35.0-36.0	26000	4.6	<10	<10	<10	<10	<10	<20	<20	32	<200
332-BH-05	03/26/99	34.0-36.5	4900	1.2	<2	<2	<2	<2	<2	<4	<4	<4	<40

Table proofed by CLC.

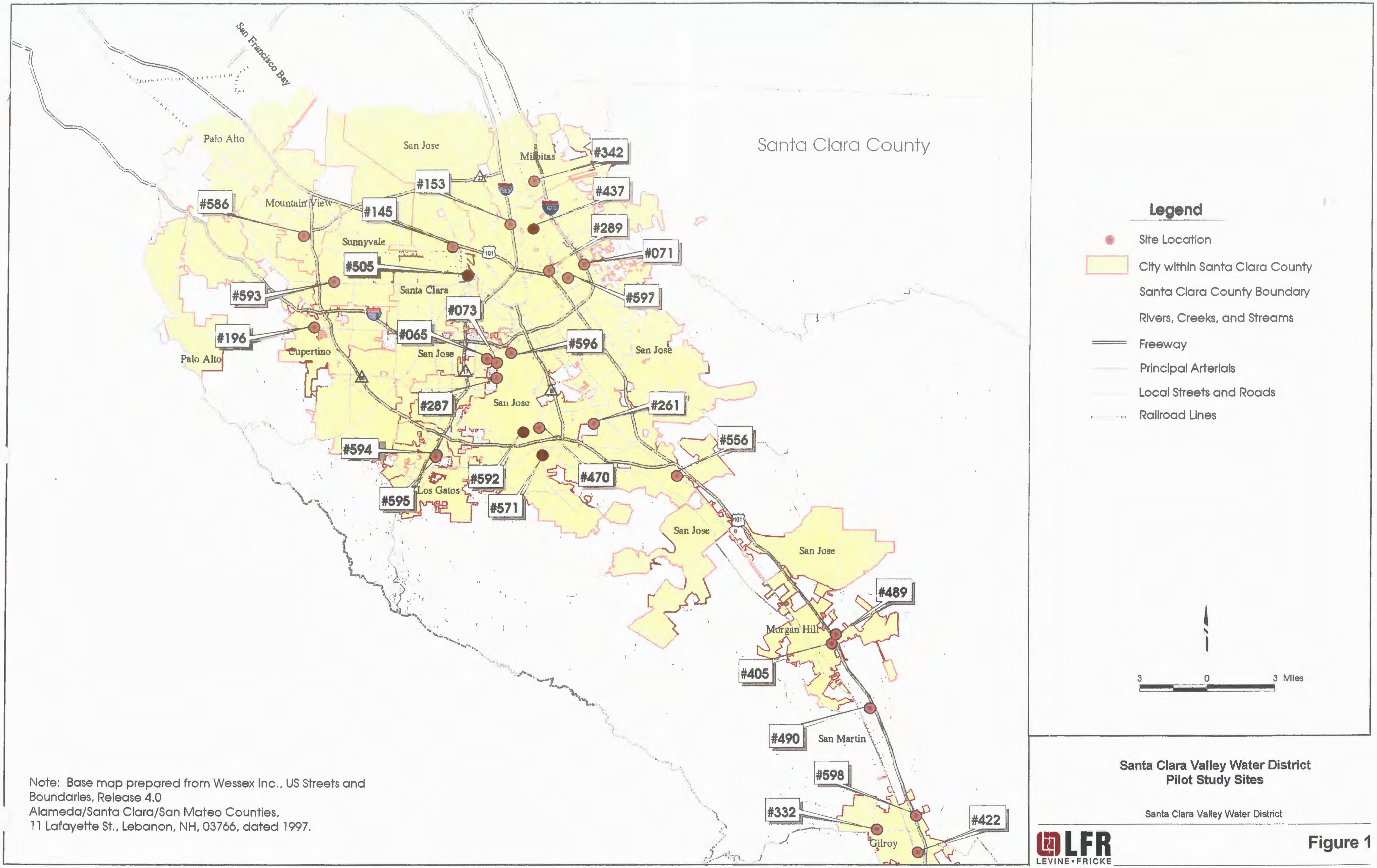
Notes:

All primary and field duplicate (-DUP) samples were analyzed by Alpha Analytical, Inc. of Sparks, NV, using EPA Method 8260 for MTBE, BTEX, DIPE, ETBE, TAME, and TBA, and Modified EPA Method 8015 for TPHg.

ft bgs = feet below ground surface
mg/L = milligrams per liter
TPH = total petroleum hydrocarbons
ug/L = micrograms per liter

Data Qualifiers (if shown on table):

J = Estimated value
UJ =Not detected at the estimated reporting limit shown



Note: Base map prepared from Wessex Inc., US Streets and Boundaries, Release 4.0
Alameda/Santa Clara/San Mateo Counties,
11 Lafayette St., Lebanon, NH, 03766, dated 1997.

Santa Clara Valley Water District
Pilot Study Sites

Santa Clara Valley Water District

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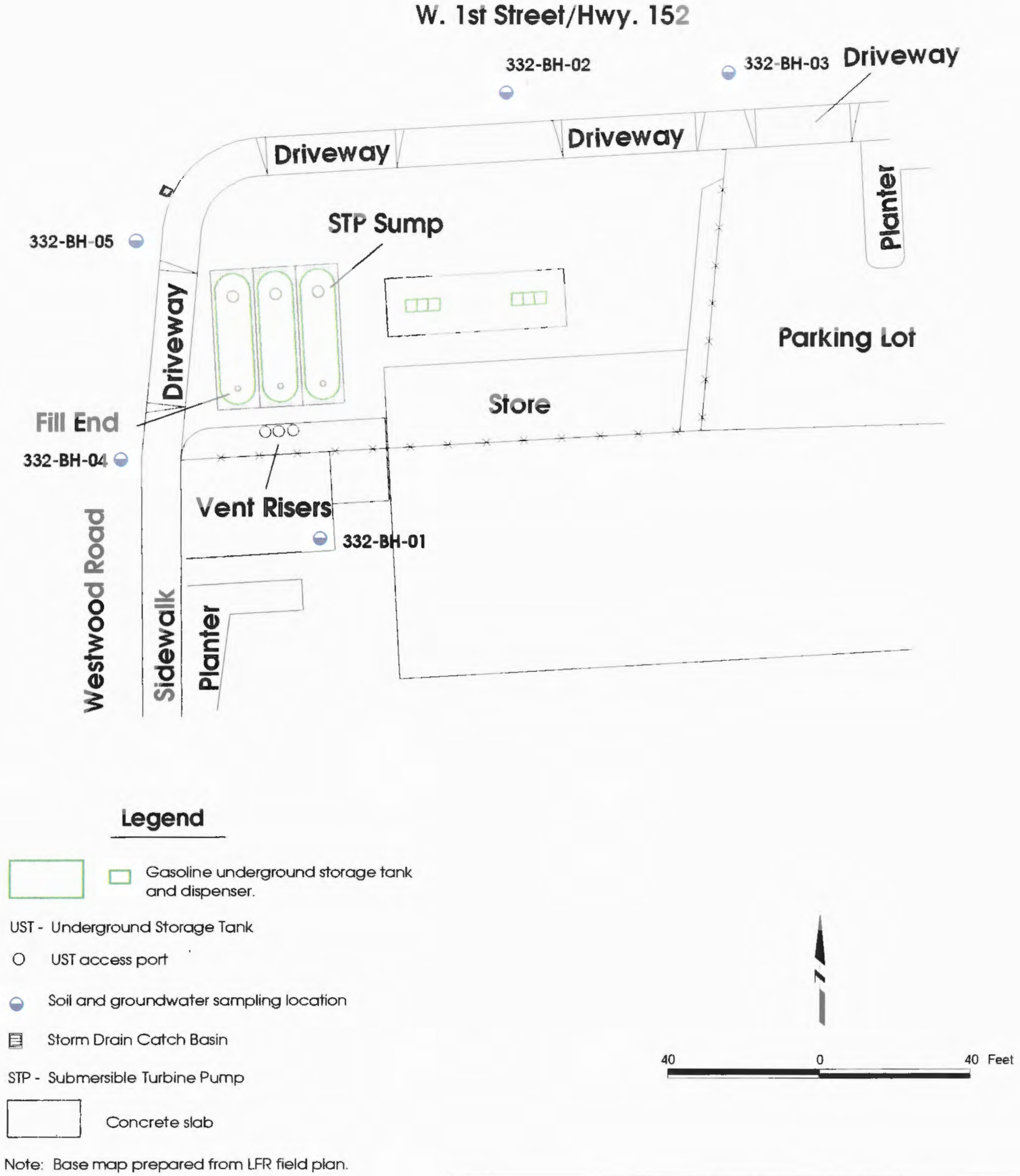
Figure 1



Site #332

Site Plan

Santa Clara Valley Water District

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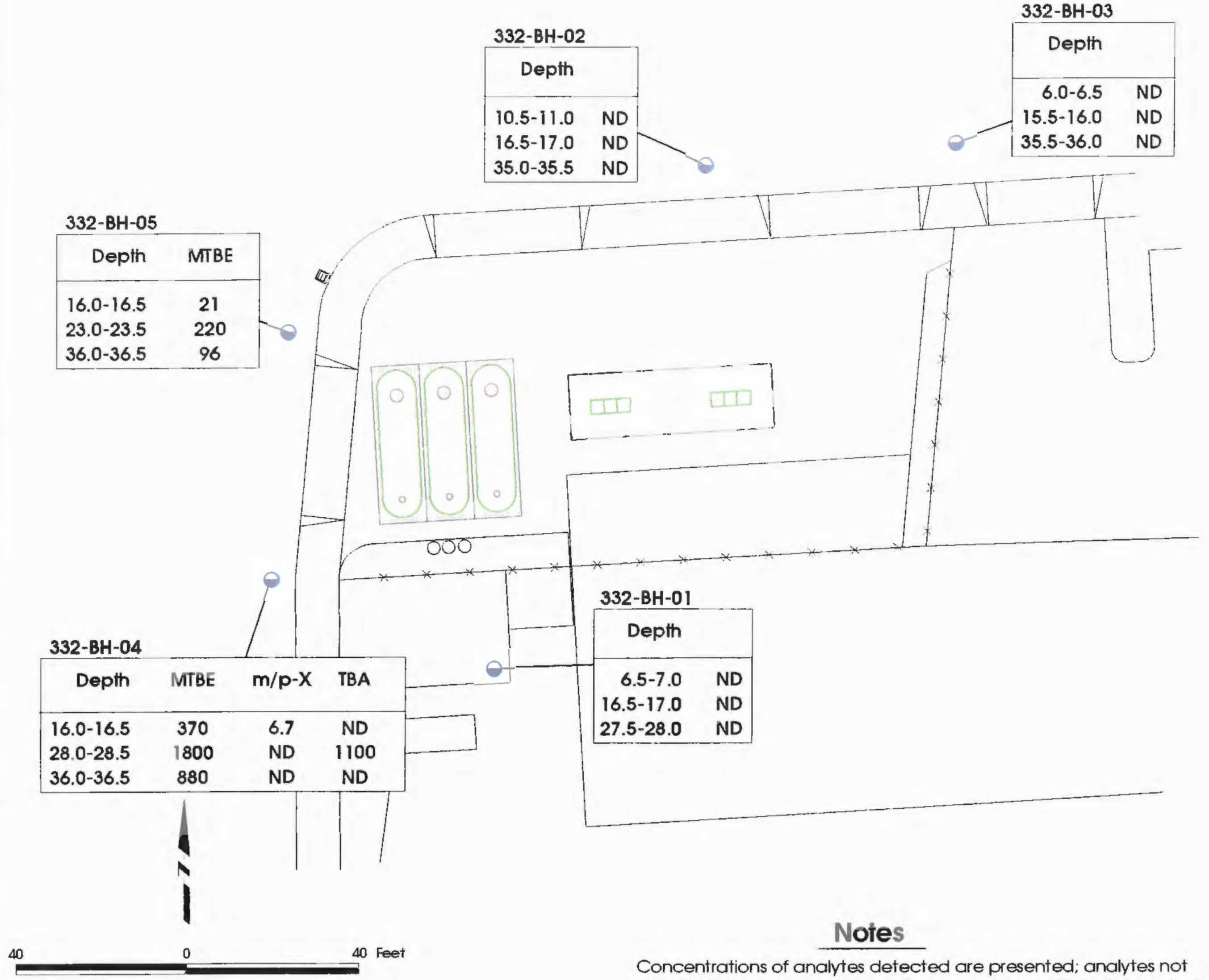
Figure 2



332-BH-02

Depth	
10.5-11.0	ND
16.5-17.0	ND
35.0-35.5	ND

332-BH-03

Depth	
6.0-6.5	ND
15.5-16.0	ND
35.5-36.0	ND

332-BH-05

Depth	MTBE
16.0-16.5	21
23.0-23.5	220
36.0-36.5	96

332-BH-01

Depth	
6.5-7.0	ND
16.5-17.0	ND
27.5-28.0	ND

332-BH-04

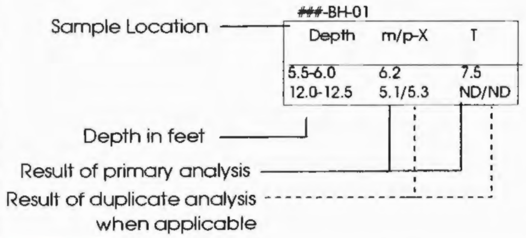
Depth	MTBE	m/p-X	TBA
16.0-16.5	370	6.7	ND
28.0-28.5	1800	ND	1100
36.0-36.5	880	ND	ND

Legend

◒ Soil and groundwater sampling location

● Soil-gas sampling location

The following represents a hypothetical sampling point and defines the characters associated with that point:



Depth	m/p-X	T
5.5-6.0	6.2	7.5
12.0-12.5	5.1/5.3	ND/ND

▭ ▭ Gasoline underground storage tank and dispenser.

○ UST access port

▤ Storm Drain Catch Basin

▭ Concrete slab

See Figure 2 for description of site features and origin of base map.

Notes

Concentrations of analytes detected are presented; analytes not detected are not presented or are presented as ND (not detected). TPHg was analyzed using Modified EPA Method 8015, all other analytes were analyzed using EPA Method 8260.

Results in micrograms/kilogram (ug/Kg) for all compounds except TPHg which is presented in milligrams/kilogram (mg/Kg).

RL = Reporting Limit

Each sample was analyzed for the following:

MTBE = Methyl Tertiary Butyl Ether (RL = 5 ug/Kg)
TPHg = Total Petroleum Hydrocarbons as Gasoline (RL = 1 mg/Kg)
B = Benzene (RL = 5 ug/Kg)
T = Toluene (RL = 5 ug/Kg)
E = Ethyl Benzene (RL = 5 ug/Kg)
m/p-X = meta/para-Xylenes (RL = 5 ug/Kg)
o-X = ortho-Xylene (RL = 5 ug/Kg)
DIPE = Di-isopropyl Ether (RL = 20 ug/Kg)
ETBE = Ethyl Tertiary Butyl Ether (RL = 20 ug/Kg)
TAME = Tertiary Amyl Methyl Ether (RL = 20 ug/Kg)
TBA = Tertiary Butyl Alcohol (RL = 200 ug/Kg)

Site #332

Summary of Chemical Analysis Results for Soil Samples

Santa Clara Valley Water District

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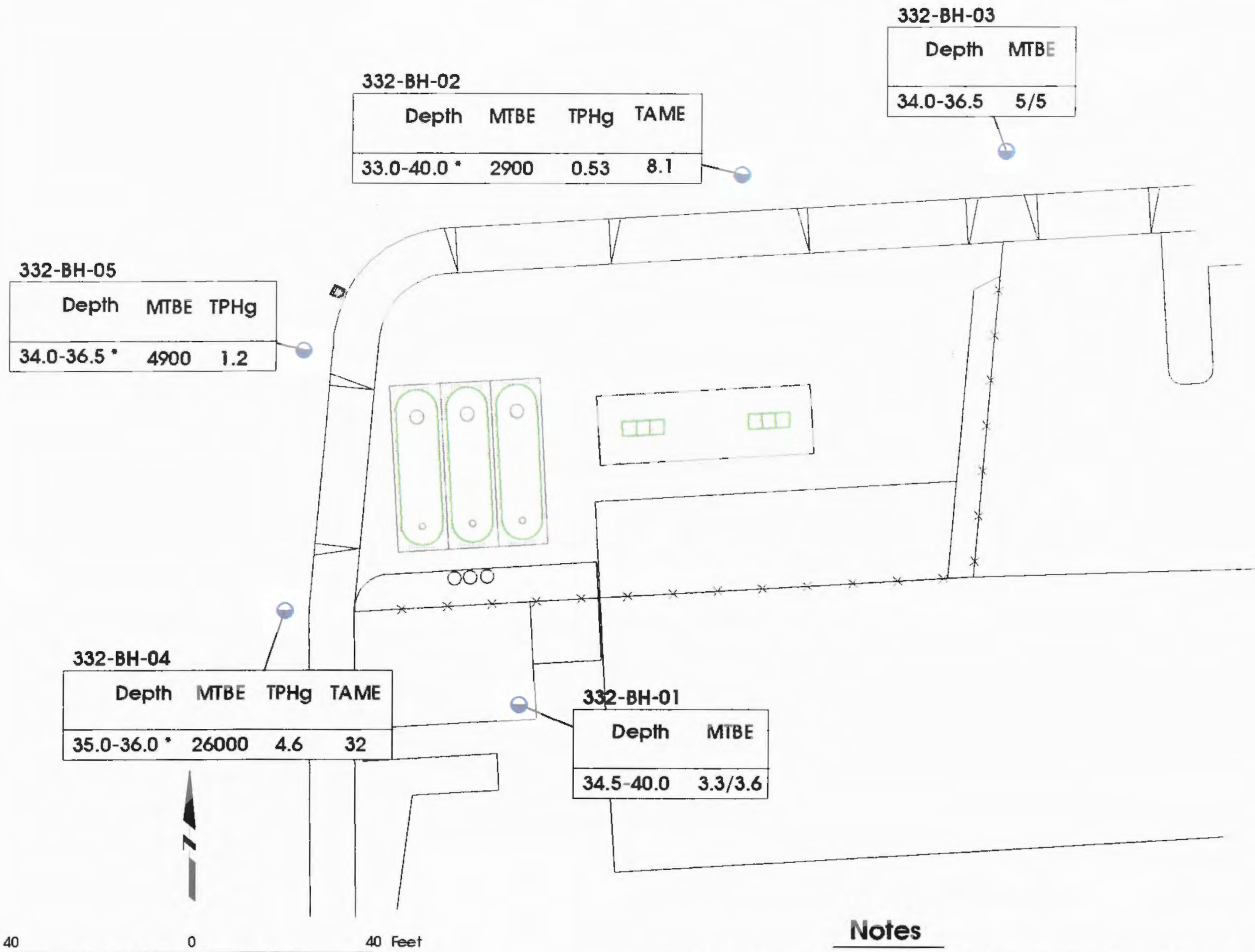
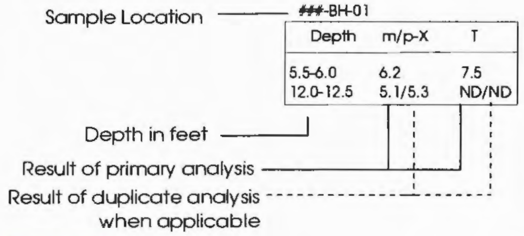
Figure 3



Legend

- ⊖ Soil and groundwater sampling location
- ● Soil-gas sampling location

The following represents a hypothetical sampling point and defines the characters associated with that point:



- 🟩 Gasoline underground storage tank and dispenser.
- ○ UST access port
- ▤ Storm Drain Catch Basin
- ☐ Concrete slab

See Figure 2 for description of site features and origin of base map.

Notes

Concentrations of analytes detected are presented; analytes not detected are not presented or are presented as ND (not detected). TPHg was analyzed using Modified EPA Method 8015, all other analytes were analyzed using EPA Method 8260.

Results in micrograms/liter (ug/L) for all compounds except TPHg which is presented in milligrams/liter (mg/L).

* Indicates elevated RL (see results table for reporting limits)
RL = Reporting Limit

Each sample was analyzed for the following:

MTBE = Methyl Tertiary Butyl Ether (RL = 0.5 ug/L)
TPHg = Total Petroleum Hydrocarbons as Gasoline (RL = 0.05 mg/L)
B = Benzene (RL = 0.5 ug/L)
T = Toluene (RL = 0.5 ug/L)
E = Ethyl Benzene (RL = 0.5 ug/L)
m/p-X = meta/para-Xylenes (RL = 0.5 ug/L)
o-X = ortho-Xylene (RL = 0.5 ug/L)
DIPE = Di-isopropyl Ether (RL = 1 ug/L)
ETBE = Ethyl Tertiary Butyl Ether (RL = 1 ug/L)
TAME = Tertiary Amyl Methyl Ether (RL = 1 ug/L)
TBA = Tertiary Butyl Alcohol (RL = 10 ug/L)

Site #332

Summary of Chemical Analysis Results for Groundwater Samples

Santa Clara Valley Water District

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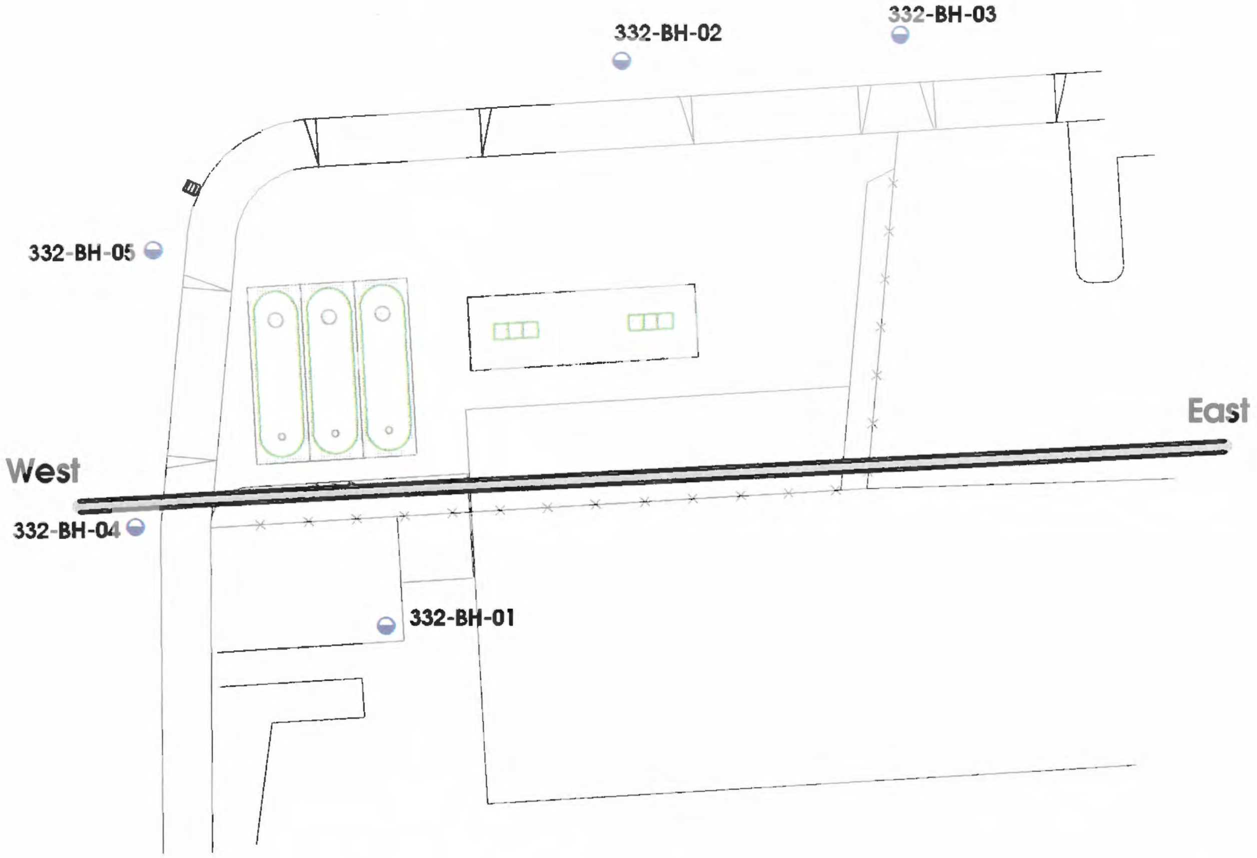
Figure 4



Legend

◒ Soil and groundwater sampling location

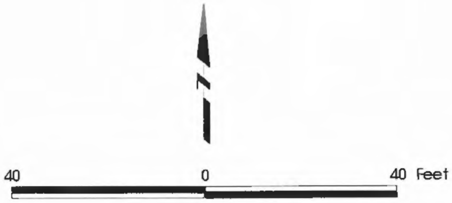
○ UST access port

🟩 🟩 Gasoline underground storage tank and dispenser.

▭ Concrete slab

▤ Storm Drain Catch Basin

See Figure 2 for description of site features and origin of base map.



Site #332

Site Plan Showing Orientation of Vertical Profile

Santa Clara Valley Water District

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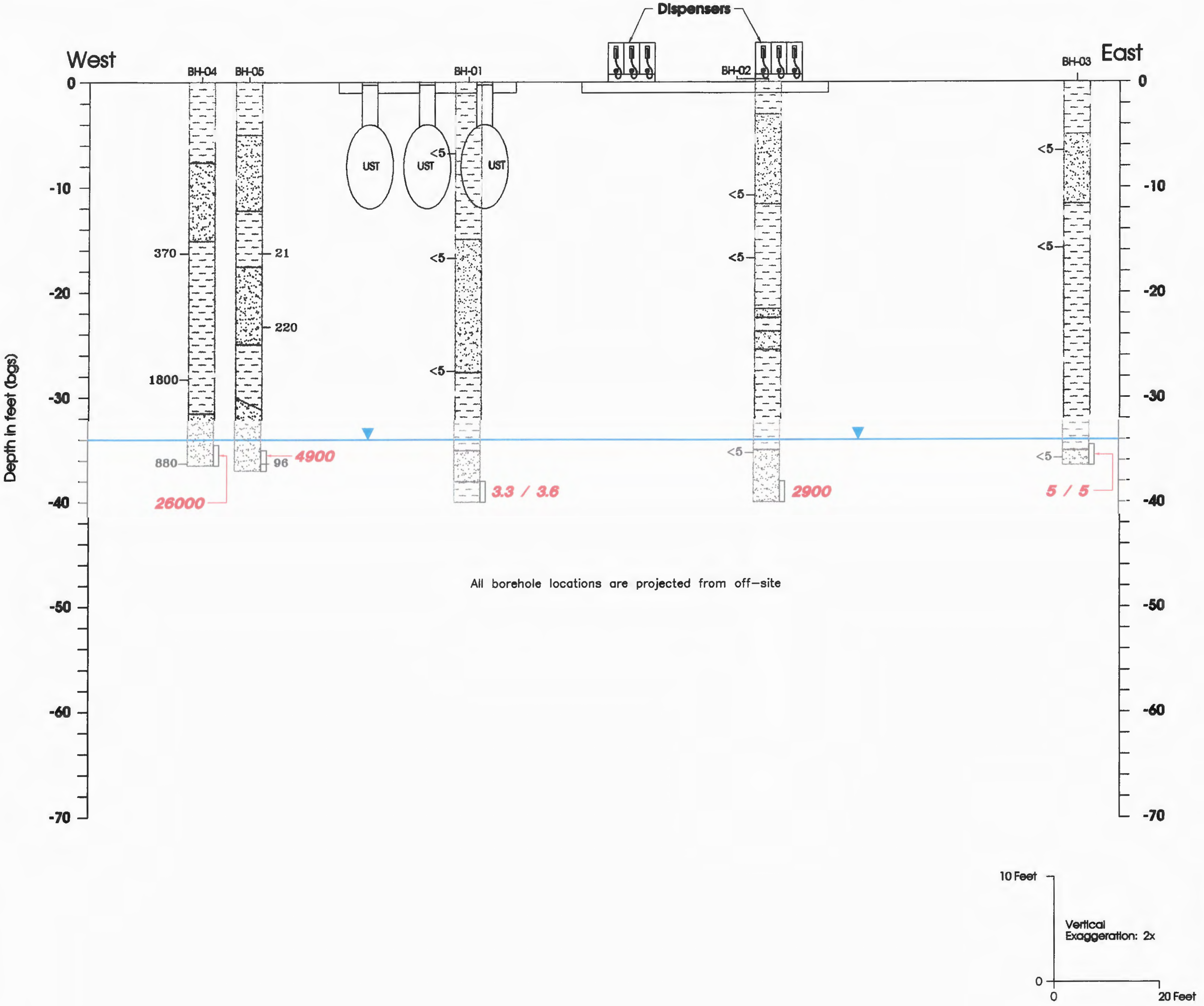
Figure 5



Legend and Abbreviations

<5	Concentration of MTBE detected in soil sample (µg/kg)
▼	Shallowest measured depth to groundwater
5 / 5	Concentration of MTBE detected in primary and duplicate groundwater samples (µg/l)
UST	Underground storage tank
BH-01	Borehole location

Borehole

Soil sample location

Groundwater sample location

▤	Silts, Clays
▨	Sands, Gravels

NOTE: All borehole locations are projected from off-site

Site #332

Vertical Profile Schematic

Santa Clara Valley Water District

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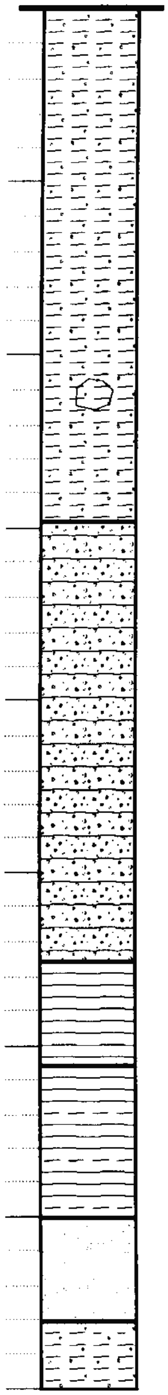
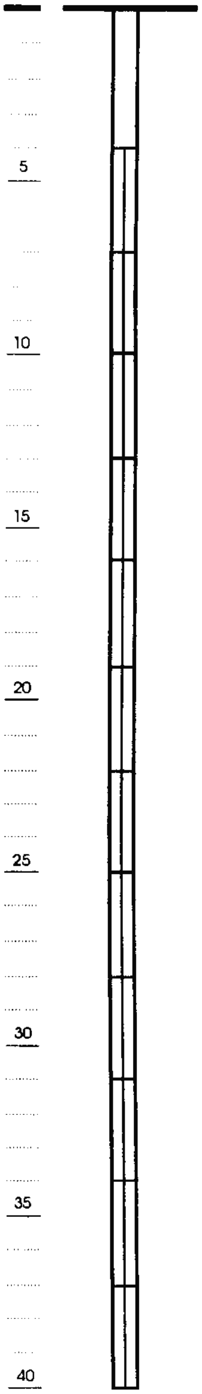
Figure 6

J:\ENGCAD\6730\CM\#332.DWG 05/19/99 cm #071.PCP

SCVWD PILOT STUDY


Graphic Log

Depth, feet	Water Level	PID Reading (ppm)	Lithologic Description
		0.0	GRAVELLY SILT (ML), dark brown, moist, low plasticity, 10 to 20% fine rounded gravel, trace medium sand.
		0.0	
5			
		0.0	Very dense. Yellowish brown, fine to coarse, subrounded to subangular gravel.
10		0.0	
		0.0	Poor recovery. Cobble.
			Very poor recovery.
		0.0	
15			
			CLAYEY GRAVEL (GC), dark yellowish brown, moist, very dense, rounded to subangular, fine to coarse, gravel and weathered rock fragments.
			Refusal.
20		0.0	
		0.0	
		0.0	
25			
		0.0	
		0.0	
		0.0	CLAY (CH), dark yellowish brown, moist, stiff, high plasticity.
30			
		0.0	SILTY CLAY (CL), dark yellowish brown, very moist, medium stiff, low plasticity.
		0.0	
		0.0	
		0.0	
35	▼ ATD	0.2	SAND (SW), olive-brown, wet, very fine-to coarse-grained sand, poorly sorted, loose.
		0.0	
		0.0	
		3.5	GRAVELLY SILT (ML), olive-brown, wet, hard, low plasticity, gravel greater than 2-inch diameter.
40			BOTTOM OF BORING AT 40 FEET.


Sample Interval

Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: March 26, 1999
LFR Geologist: Michael Bombard, R.G., CH.G.

EXPLANATION

- ▤ Clay
- ☷ Silt
- ░ Sand
- ▨ Gravel

PID - Photoionization Detector

▼ Water level at time of drilling

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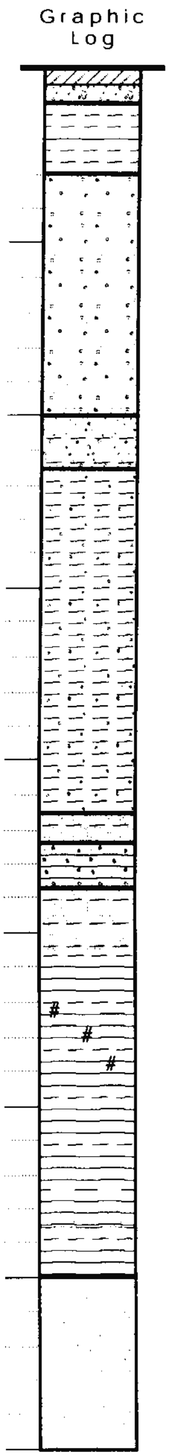
LITHOLOGY FOR 332-BH-01 *(page 1 of 1)*

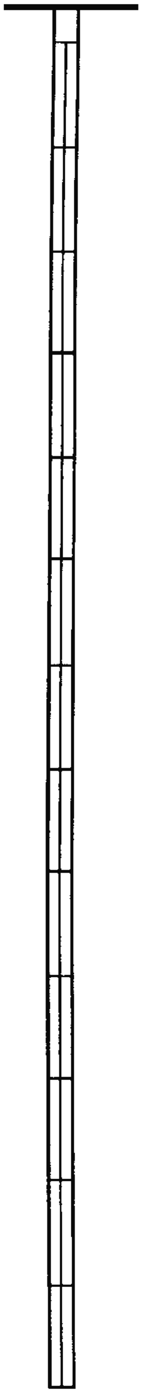
Project No. 6730.00-024

SCVWD PILOT STUDY



Depth, feet	Water Level	PID Reading (ppm)	Lithologic Description
		0.5	ASPHALT.
		0.2	Road Base.
		0.8	CLAYEY SILT (ML), dark yellowish brown, slightly moist, soft, low plasticity, abundant gravel.
		0.5	
		0.5	
5			GRAVELLY SAND (SW), dark yellowish brown, slightly moist, gravel up to 1.5-inch diameter, angular, very fine- to fine-grained sand, poorly sorted.
			No recovery.
10		0.0	GRAVELLY SILTY SAND (SM), dark yellowish brown, moist, gravel up to 1.5-inch diameter, angular.
		0.0	
		0.0	GRAVELLY SILT (ML), dark yellowish brown, moist, hard, low plasticity, gravel greater than 2-inch diameter.
		0.0	
15			Very moist from 15 to 16 feet.
		0.0	
		0.0	
		0.0	
		0.0	
20		0.0	
		0.0	
		0.0	SILTY SAND (SM), dark yellowish brown, very moist, very fine- to coarse-grained sand, poorly sorted, subangular.
		0.0	
		0.0	GRAVELLY SANDY CLAY (CL), dark yellowish brown, moist, medium stiff, low plasticity.
		0.0	SILTY SAND (SM), dark yellowish brown, moist, dense, very fine- to fine-grained sand, poorly sorted, subrounded.
25		0.0	
		0.0	SILTY CLAY (CL), dark yellowish brown, moist, medium stiff, low plasticity, fractured.
		0.0	
		0.0	
		0.0	
			No fractures, massive below 29 feet.
30		0.0	
		0.0	
		0.0	
		0.0	SANDY CLAY interbed (CL), moist, soft, low plasticity, fine- to very fine-grained sand.
		0.0	
35		0.0	SAND (SW), olive-brown, very moist, medium-grained sand, poorly sorted, loose.
		0.0	
		0.0	
		0.0	
		0.2	
40			BOTTOM OF BORING AT 40 FEET.

Sample Interval



Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: March 25, 1999
LFR Geologist: Michael Bombard, R.G., CH.G.

EXPLANATION

▤ Clay
▥ Silt
▢ Sand
▨ Gravel

PID - Photoionization Detector

▼ Water level at time of drilling

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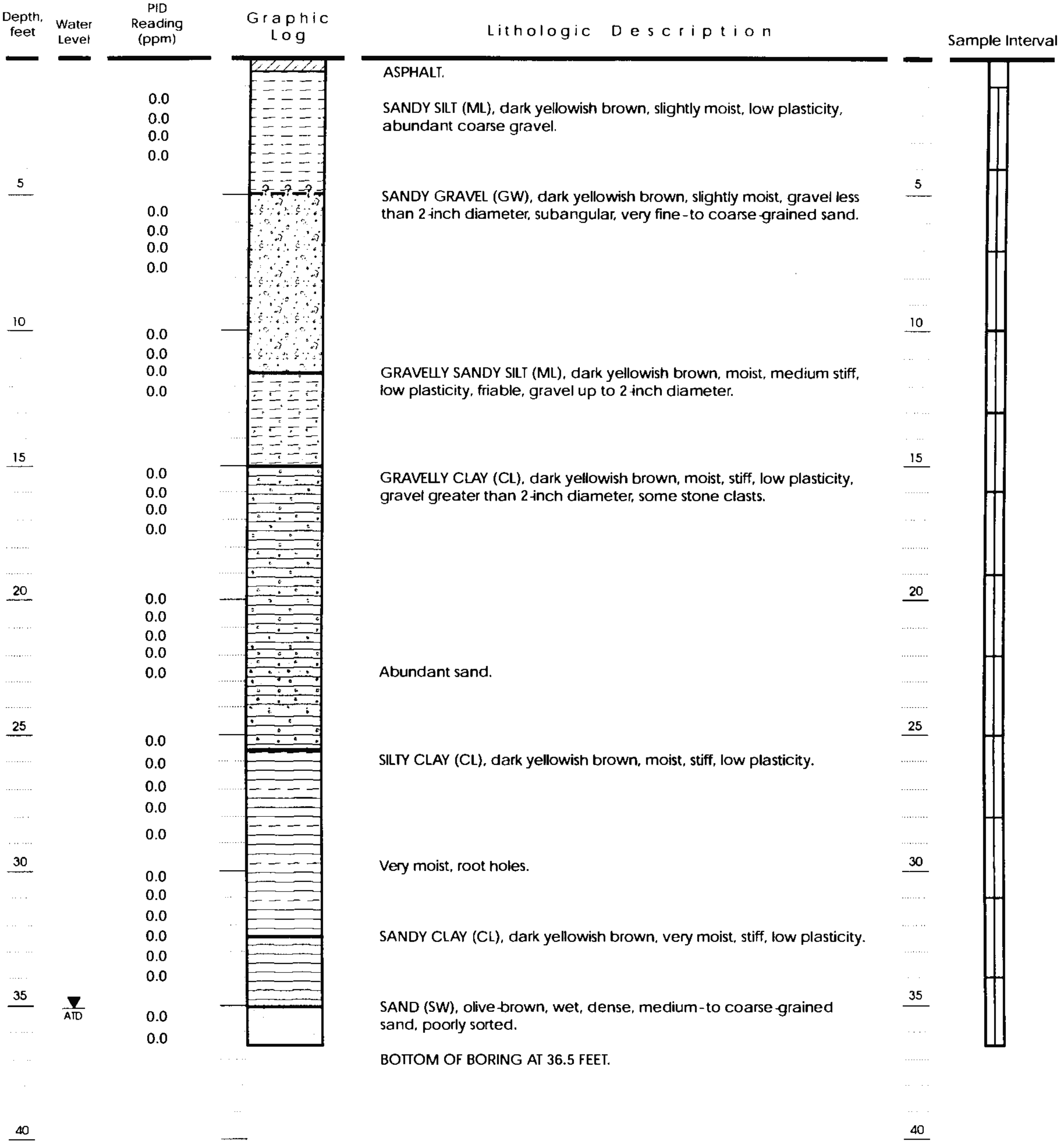
LITHOLOGY FOR 332-BH-02 *(page 1 of 1)*

Project No. 6730.00-024

SCVWD PILOT STUDY



Lithologic Description

ASPHALT.

SANDY SILT (ML), dark yellowish brown, slightly moist, low plasticity, abundant coarse gravel.

SANDY GRAVEL (GW), dark yellowish brown, slightly moist, gravel less than 2-inch diameter, subangular, very fine-to coarse-grained sand.

GRAVELLY SANDY SILT (ML), dark yellowish brown, moist, medium stiff, low plasticity, friable, gravel up to 2-inch diameter.

GRAVELLY CLAY (CL), dark yellowish brown, moist, stiff, low plasticity, gravel greater than 2-inch diameter, some stone clasts.

Abundant sand.

SILTY CLAY (CL), dark yellowish brown, moist, stiff, low plasticity.

Very moist, root holes.

SANDY CLAY (CL), dark yellowish brown, very moist, stiff, low plasticity.

SAND (SW), olive-brown, wet, dense, medium-to coarse-grained sand, poorly sorted.

BOTTOM OF BORING AT 36.5 FEET.

Drilling Method:	Dual-Tube/Direct Push
Drilling Company:	Precision
Date Well Drilled:	March 25, 1999
LFR Geologist:	Michael Bombard, R.G., CH.G.

EXPLANATION

▤ Clay

▤ Silt

▨ Sand

▨ Gravel

PID - Photoionization Detector

▼ Water level at time of drilling

LITHOLOGY FOR 332-BH-03 *(page 1 of 1)*

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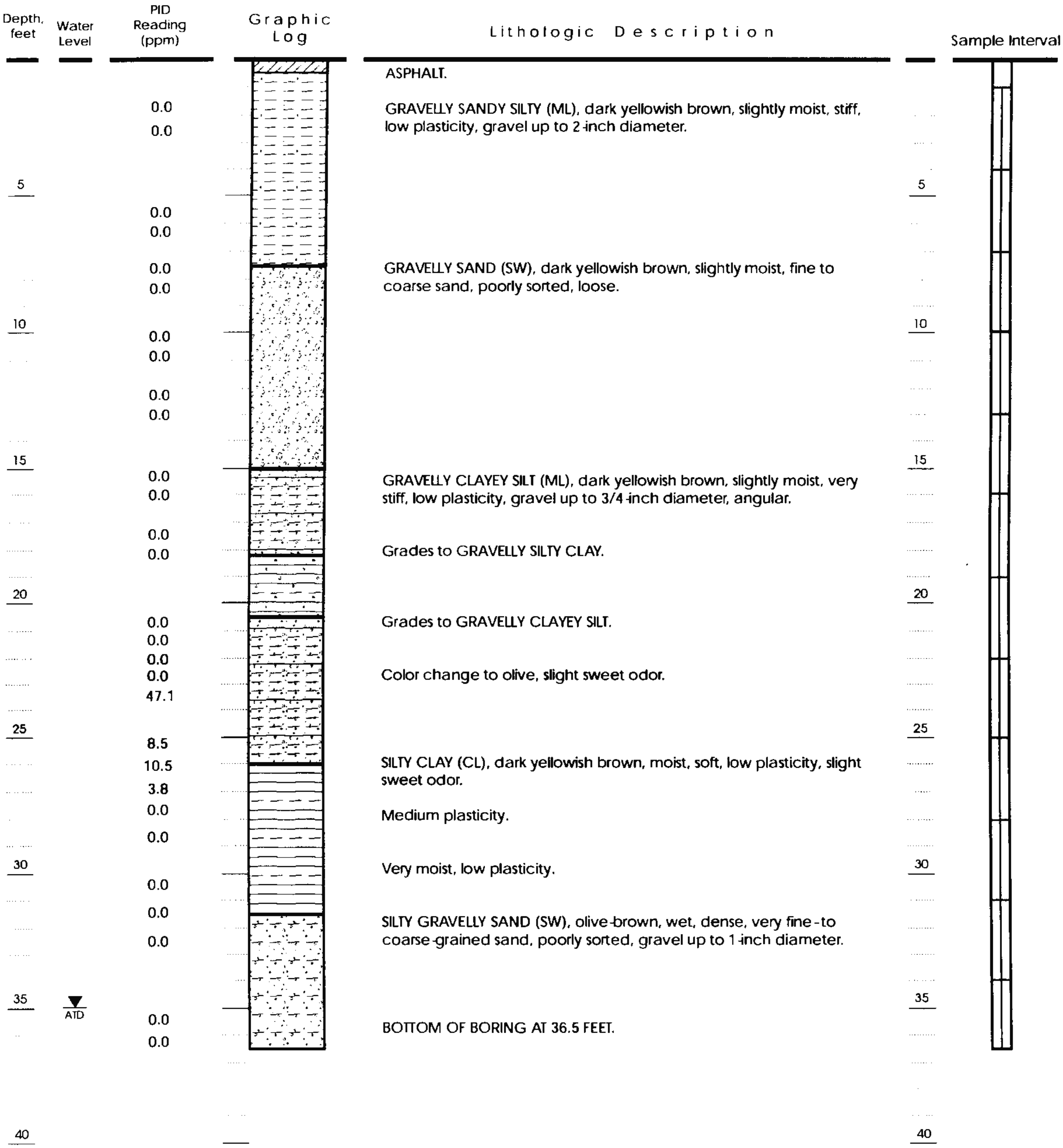
Project No. 6730.00-024

SCVWD PILOT STUDY



ASPHALT.

GRAVELLY SANDY SILTY (ML), dark yellowish brown, slightly moist, stiff, low plasticity, gravel up to 2-inch diameter.

GRAVELLY SAND (SW), dark yellowish brown, slightly moist, fine to coarse sand, poorly sorted, loose.

GRAVELLY CLAYEY SILT (ML), dark yellowish brown, slightly moist, very stiff, low plasticity, gravel up to 3/4-inch diameter, angular.

Grades to GRAVELLY SILTY CLAY.

Grades to GRAVELLY CLAYEY SILT.

Color change to olive, slight sweet odor.

SILTY CLAY (CL), dark yellowish brown, moist, soft, low plasticity, slight sweet odor.

Medium plasticity.

Very moist, low plasticity.

SILTY GRAVELLY SAND (SW), olive-brown, wet, dense, very fine-to coarse-grained sand, poorly sorted, gravel up to 1-inch diameter.

BOTTOM OF BORING AT 36.5 FEET.

Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: March 26, 1999
LFR Geologist: Michael Bombard, R.G., CH.G.

EXPLANATION

- ▤ Clay
- ▤ Silt
- ▨ Sand
- ▨ Gravel

PID - Photoionization Detector

▼ Water level at time of drilling

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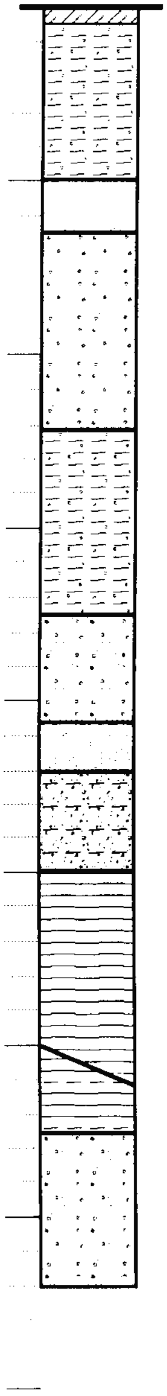
LITHOLOGY FOR 332-BH-04 *(page 1 of 1)*

Project No. 6730.00-024

SCVWD PILOT STUDY

Depth, feet | Water Level | PID Reading (ppm) | Graphic Log | Lithologic Description | Sample Interval



Depth, feet	Water Level	PID Reading (ppm)
		0.0
		0.0
5		
		0.0
		0.0
		0.0
		0.0
10		
		0.0
		0.0
		0.0
		0.0
15		
		0.0
		0.0
		0.0
		0.0
20		
		0.0
		0.0
		0.0
		0.0
25		
		0.0
		0.0
		0.0
		0.0
30		
		0.0
		0.0
		0.0
		0.0
	▼ ATD	
35		
		0.0
		0.0
40		

ASPHALT.

GRAVELLY SILT (ML), dark yellowish brown, moist, medium stiff, low plasticity, minor clay, gravel up to 1-inch diameter.

SAND (SP), yellowish brown, slightly moist, hard, medium-grained sand, poorly sorted, indurated, friable.

GRAVELLY SAND (SW), dark yellowish brown, moist, fine to coarse grained, poorly sorted, loose, gravel up to 1.5-inch diameter, subangular.

GRAVELLY SILT (ML), dark yellowish brown, moist, medium stiff, low plasticity, gravel up to 2-inch diameter, angular.

GRAVELLY SAND (SW), olive-brown, moist, dense, very fine-to coarse-grained sand, poorly sorted.

SAND (SP), olive, slightly moist, hard, medium-grained sand, well sorted, indurated.

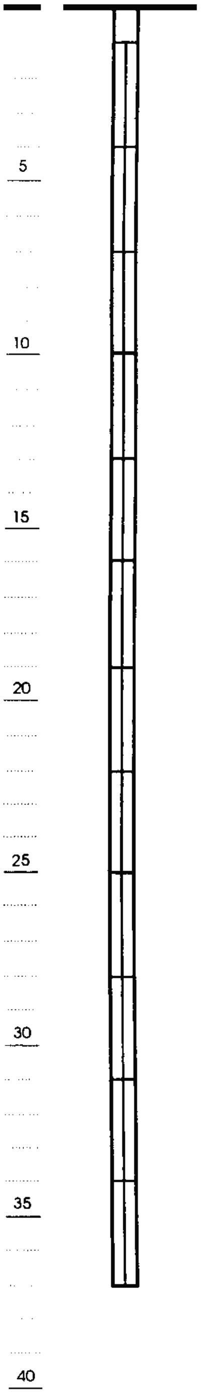
GRAVELLY SILTY SAND (SW), dark yellowish brown, moist, medium dense, very fine-to coarse-grained sand, poorly sorted, gravel greater than 2-inch diameter.

CLAY (CH), dark yellowish brown, moist, soft, high plasticity.

Grades to SILTY CLAY (CL), low to medium plasticity.

GRAVELLY SAND (SW), dark yellowish brown, very moist, very fine-to coarse-grained sand.

BOTTOM OF BORING AT 37 FEET.



EXPLANATION

☰	Clay
▤	Silt
░	Sand
▨	Gravel

PID - Photoionization Detector

▼ Water level at time of drilling

Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: March 26, 1999
LFR Geologist: Michael Bombard, R.G., CH.G.

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LITHOLOGY FOR 332-BH-05 *(page 1 of 1)*

Project No. 6730.00-024

SANTA CLARA VALLEY WATER DISTRICT
Pilot Study of Operating Underground Storage Tanks
Santa Clara County, California

Site Report

SITE NUMBER 342

Olympian Oil Company
800 Ames Avenue
Milpitas, California 95035

April 23, 1999

This Site Report is one of a series of reports prepared for the Santa Clara Valley Water District's Pilot Study of Operating Underground Storage Tanks. The District funded this study to assess if MtBE is being released from UST systems that meet 1998 federal- and state-mandated upgrade requirements. The District will use the results of the Pilot Study, and possibly information obtained during subsequent investigations, to evaluate whether up-graded UST systems that handle MtBE are protective of groundwater quality, and ultimately drinking water. This Study and other District groundwater vulnerability assessments are critical in formulating a plan to protect drinking water supplies into the future.

With cooperation from the site owner and operator and the assistance of the Milpitas Fire Department, LFR Levine·Fricke completed a file review, site inspection, and soil-gas, soil, and groundwater sampling at this site on behalf of the District. LFR's subcontractor, Integrated Engineering Services, completed a UST inspection at this site. This report provides a brief summary of investigation findings, and site-specific data in tables, figures, and appendices. This Site Report is appended to the Summary Report for the Study.

LFR
LEVINE·FRICKE
1900 Powell Street, 12th Floor
Emeryville, California 94608-1827
(510) 652-4500/Fax (510) 652-2246

SUMMARY OF FINDINGS

SITE DESCRIPTION

Figure 1 illustrates the site location. Site geology consists primarily of clayey silts and silty clays with thin layers of interbedded sands and gravel to approximately 45 feet below the ground surface (bgs). The shallowest depth to water was measured at approximately 11 feet bgs (January 1999).

SYSTEM DESCRIPTION

The UST system at the site consists of two double-walled 10,000-gallon gasoline tanks and one double-walled split tank with a 6,000-gallon compartment for gasoline and a 14,000-gallon compartment for diesel. All of the USTs are constructed of bare steel with fiberglass reinforced plastic [FRP] exterior corrosion protection and double-walled fiberglass piping. The UST system utilizes continuous interstitial monitoring for both piping leak detection and UST leak detection.

RESULTS

MtBE was detected in soil-gas, soil, and groundwater at this Site. MtBE was detected in 7 of the 11 soil-gas samples collected at concentrations ranging from 26 μg/l to 91 μg/l. MtBE was detected in 8 of the 13 soil samples collected at concentrations ranging from 13 μg/kg to 140 μg/kg. MtBE was detected in 5 of the 8 groundwater samples collected at concentrations ranging from 1.2 μg/l to 1700 μg/l. The 1700 μg/l concentration is associated with a groundwater sample collected from an existing monitoring well on the site. Petroleum hydrocarbons constituents (benzene, toluene, ethylbenzene, and/or xylenes) were also detected in soil-gas, soil, and groundwater samples.

SITE SELECTION CRITERIA MET

1998 upgrade compliant?	Yes
On SCVWD fuel leak database?	No
Status:	Not applicable
Distance from LUST site:	Greater than 250 feet
Distance to water supply well:	Greater than 2000 feet
Access granted?	Yes
SCVWD approved?	Yes

FILE REVIEW SUMMARY

Number of tanks:	3
Reported release?	No
Release date:	Not applicable
Fuel released:	Not applicable
Location:	Not applicable
Quantity (gallons):	Not applicable
Data available:	Not applicable

Comments:

SITE VISIT - UST SYSTEM INFORMATION

Precision tank tightness records available?	No
Date of last test:	Not applicable
Method of tank testing:	Not applicable
Tank leak rate (gallons/hour):	Not applicable
UST overfill prevention system present?	Yes
Type of system:	Both overfill limiter and drop tube/check-valve
Automatic shut-off?	Yes
System operational?	Yes
Overfill containment (gallons):	15
Drop tube equipped with striker plate?	Yes
Under island containment present?	Yes
Under island containment monitoring:	None
Quick release dispenser hoses?	Yes
Alarm system functional?	Yes
Type:	Shut-Off
Vents:	
Vent type:	Dedicated
Vent piping:	Single walled
Condition of UST turbine sump:	Fair
Condition of UST flex line sump:	Fair
Vapor recovery system:	Balanced
Years of operation since upgrade:	Approximately 8 years
Years of operation as fueling facility:	Approximately 8 years
Estimated throughput:	100,000 to 300,000 gallons per month
Monitoring systems operational?	Not tested
Systems operations, comment:	Alarms are monitored off-site.
Tank annular space monitoring:	Liquid probe
Overfill containment monitoring system:	Liquid probe
Piping leak detection:	Liquid probe
Is system monitored?	Yes
Station inventory records available?	Not available
Records up to date?	Not applicable
Records complete?	Not applicable
Supplier log reviewed?	Not available
Spill log reviewed?	No
Spill log comments:	None maintained
Personnel training:	Not noted

Comments:

There was a fair amount of water in the overspill containment for all 3 tanks. In addition, there was a small amount of fuel (< 1 gallon) in the turbine sump for the 87 tank located south of the others.

SITE INSPECTION

Condition of apron around pumps:	Good
Evidence of recent paving/regrading?	No
Location of recent paving/regrading:	Not applicable
Description of surface drainage?	To north
Direct route for surface spills to subsurface?	Possible
Description of route to subsurface:	Storm drains to north, and creek to east
Other potential petroleum sources?	Yes
Description of other petroleum sources:	Railroad tracks to the west
Nearby surface water?	Yes
Name of surface water:	Berryessa Creek
Type of surface water:	Stream

Comments:

Field staff noted surface spillage of gas and diesel during CPT actvities. During soil and groundwater sampling activities, field staff noted an alarm sounding from inside the station building.

UST SYSTEM DATA FROM FORM B COLLECTED DURING FILE REVIEWS - TANK ID

Date installed:	1990
Tank capacity (gallons):	See site information
Tank contents:	Regular unleaded Premium unleaded Midgrade unleaded
Tank construction:	
Type of system:	Double wall
Tank material (primary tank):	Bare steel
Lining compatible with 100% methanol:	No
Exterior corrosion protection:	Fiberglass reinforced plastic
Date spill containment installed:	Not noted
Date overfill protection equipment installed:	Not noted
Drop tube:	Not noted
Striker plate:	Not noted
Dispenser containment:	Not noted
Piping information:	
System type:	Pressure, underground
Construction:	Double wall, underground
Material and corrosion protection:	Fiberglass pipe, underground
Leak detection:	Continuous interstitial monitoring Visual check, Invoice reconciliation
Tank leak detection?	Visual check

Vadose zone monitoring
Continuous interstitial monitoring

Table 1
Summary of Chemical Analysis Results for Soil-Gas Samples - Site #342
Santa Clara Valley Water District

Location	Date Sampled	Depth (ft bgs)	Methyl Tertiary Butyl Ether (MTBE) ug/L	TPH as Gasoline (TPHg) ug/L	Benzene (B) ug/L	Toluene (T) ug/L	Ethyl Benzene (E) ug/L	meta/para-Xylenes (m/p-X) ug/L	ortho-Xylene (o-X) ug/L	Notes
342-SG-01	01/12/99	8	26	<100	<1	8.3	1.3	<1	<1	
		12	<5	<100	<1	<1	3	<1	<1	
342-SG-02	01/12/99	8	45	<100	<1	3.7	<1	1.4	<1	
342-SG-02-SPL		8	91	NA	<0.23	<0.27	<0.31	0.51 J	<0.31	
342-SG-03	01/13/99	8	45	<100	<1	7.4	<1	<1	1.6	
		10	52	107	<1	14	2.6	<1.2	1.6	
342-SG-04	01/13/99	8	<5	<100	<1	1.9	<1	<1	<1	
342-SG-05	01/13/99	8	<5	<100	<1	1.0	<1	1.3	<1	
342-SG-06	01/13/99	8	63	9245 J	<1	33	6.0	<1	<1	
342-SG-06-DUP		8	65	9163 J	<1	34	1.5	<1	<1	
342-SG-07	01/13/99	8	<5	<100	<1	1.2	<1	<1	<1	

Table proofed by CLC.

Notes:

All primary and field duplicate (-DUP) samples were analyzed on site by InterPhase, of Los Angeles, CA using EPA Method 8020 for MTBE and BTEX, and Modified EPA Method 8015 for TPHg.
Additional field duplicate samples (-SPL) were analyzed off site by Air Toxics, Ltd., Folsom, CA using EPA Method TO-14.
ft bgs = feet below ground surface
NA = Not analyzed
TPH = total petroleum hydrocarbons
ug/L = micrograms per liter

Data Qualifiers (if shown on table):
E = Exceeds the calibration range
I = Interference by the sample matrix
J = Estimated value
UJ = Not detected at the estimated reporting limit shown

Table 2
Summary of Chemical Analysis Results for Soil Samples - Site #342
Santa Clara Valley Water District

Location	Date Sampled	Depth (ft bgs)	Methyl Tertiary Butyl Ether (MTBE) ug/Kg	TPH as Gasoline (TPHg) mg/Kg	Benzene (B) ug/Kg	Toluene (T) ug/Kg	Ethyl Benzene (E) ug/Kg	meta/para-Xylenes (m/p-X) ug/Kg	ortho-Xylene (o-X) ug/Kg	Di-isopropyl Ether (DIPE) ug/Kg	Ethyl Tertiary Butyl Ether (ETBE) ug/Kg	Tertiary Amyl Methyl Ether (TAME) ug/Kg	Tertiary Butyl Alcohol (TBA) ug/Kg
342-BH-01	01/18/99	6.0-6.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		11.0-11.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
342-BH-02	01/18/99	5.5-6.0	53	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		10.5-11.0	70	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
342-BH-03	01/18/99	2.5-3.0	28	5.6	<5	<5	<5	21	6.0	<20	<20	<20	<200
		5.0-5.5	74	<1	<5	<5	<5	15	5.4	<20	<20	<20	<200
		10.0-10.5	140	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
342-BH-04	01/19/99	5.5-6.0	13	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		10.5-11.0	32	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
342-BH-05	01/19/99	6.0-6.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		11.0-11.5	78	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
342-BH-06	01/19/99	5.5-6.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		11.0-11.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200

Table proofed by CLC.

Notes:

All samples were analyzed by Alpha Analytical, Inc. of Sparks, NV, using EPA Method 8260 for MTBE, BTEX, DIPE, ETBE, TAME, and TBA, and Modified EPA Method 8015 for TPHg.

ft bgs = feet below ground surface

mg/Kg = milligrams per kilogram

TPH = total petroleum hydrocarbons

ug/Kg = micrograms per kilogram

Data Qualifiers (if shown on table):

J = Estimated value

UJ =Not detected at the estimated reporting limit shown

Table 3
Summary of Chemical Analysis Results for Groundwater Samples - Site # 342
Santa Clara Valley Water District

Location	Date Sampled	Depth (ft bgs)	Methyl Tertiary Butyl Ether (MTBE) ug/L	TPH as Gasoline (TPHg) mg/L	Benzene (B) ug/L	Toluene (T) ug/L	Ethyl Benzene (E) ug/L	meta/para-Xylenes (m/p-X) ug/L	ortho-Xylene (o-X) ug/L	Di-isopropyl Ether (DIPE) ug/L	Ethyl Tertiary Butyl Ether (ETBE) ug/L	Tertiary Amyl Methyl Ether (TAME) ug/L	Tertiary Butyl Alcohol (TBA) ug/L
342-BH-01	02/01/99	20.0-25.0	1.2	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<10
342-BH-02	02/01/99	20.0-25.0	<0.5	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<10
342-BH-02-DUP		20.0-25.0	<0.5	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<10
342-BH-03	02/01/99	20.0-25.0	25	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<10
342-BH-04	01/19/99	25.0	21	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<10
342-BH-05	01/19/99	25.0	430	<0.25	<1	<1	<1	<1	<1	<2	<2	<2	<20
342-BH-06	01/19/99	25.0	<0.5	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<10
342-MW-01	02/01/99	12.0	1700	<0.5	3.6	15	<2	2.6	13	<4	<4	<4	650

Table proofed by CLC.

Notes:

All primary and field duplicate (-DUP) samples were analyzed by Alpha Analytical, Inc. of Sparks, NV, using EPA Method 8260 for MTBE, BTEX, DIPE, ETBE, TAME, and TBA, and Modified EPA Method 8015 for TPHg.

ft bgs = feet below ground surface
mg/L = milligrams per liter
TPH = total petroleum hydrocarbons
ug/L = micrograms per liter

Data Qualifiers (if shown on table):

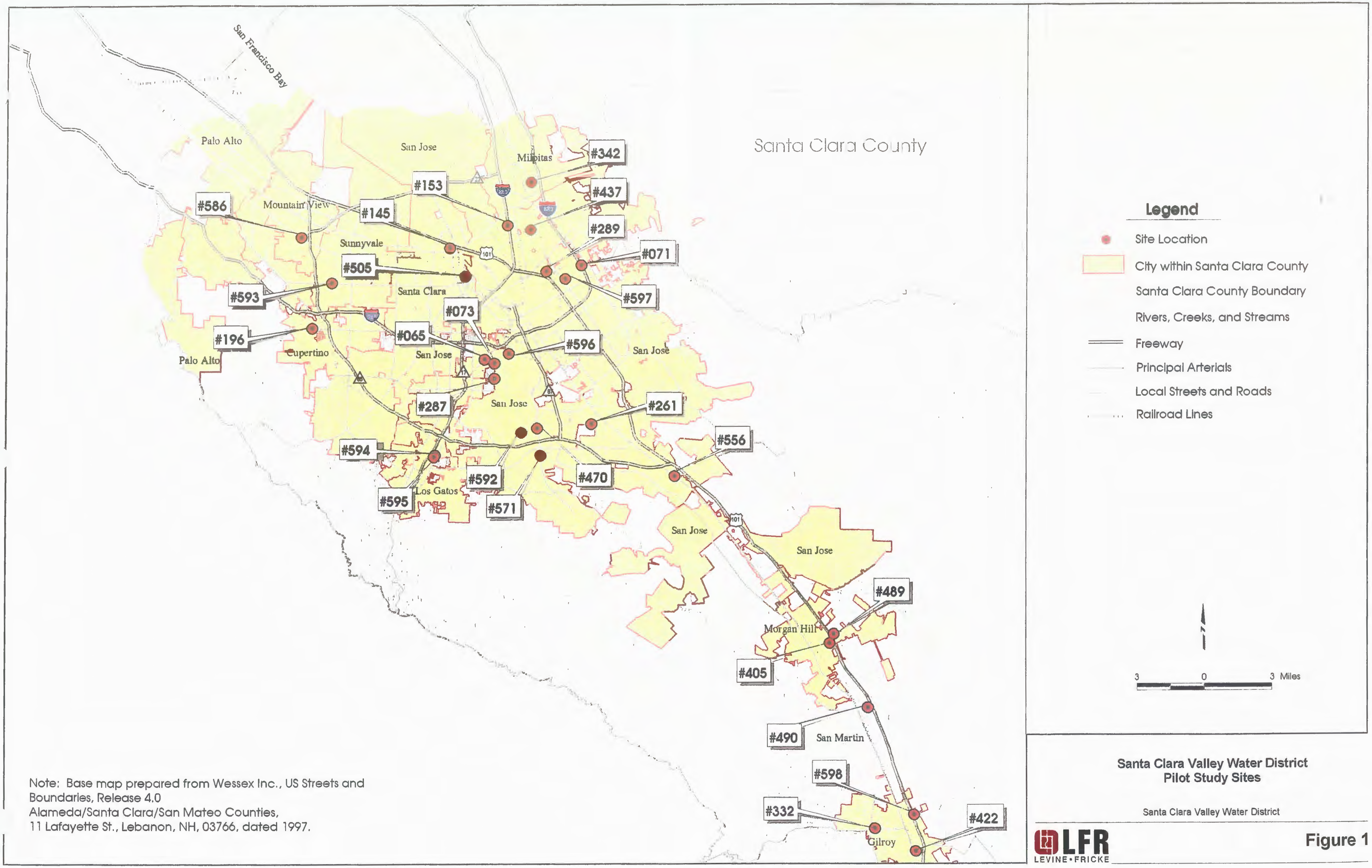
J = Estimated value
UJ =Not detected at the estimated reporting limit shown

Table 4
Summary of Physical Parameters for Soil Samples - Site #342
Santa Clara Valley Water District

Location	Depth (ft bgs)	Visual Description	Total Organic Carbon (percent)	Moisture Content (percent)	Wet Weight (lbs/cu.ft.)	Dry Unit Weight (lbs/cu.ft.)	Porosity (percent)
342-BH-01	18.5 - 19.0	Brown fine sandy clay	0.23	21.95	133.4	109.4	35.05
342-BH-02	15.5 - 16.0	Brown fine sandy clay	0.21	28.06	124.9	97.5	42.11
342-BH-04	24.5 - 25.0	Brown clayey sand with gravel	0.13	11.55	140.2	125.7	25.37

Table proofed by CLC.

Notes:
Specific gravity values were 2.70 for all samples analyzed.
Total organic carbon analyses were performed by Curtis and Tompkins Analytical Laboratories, Berkeley, CA.
All other analyses were performed by URS Greiner Woodward Clyde, Oakland, CA.
ft bgs = feet below ground surface
lbs/cu.ft. = pounds per cubic foot
NA = Not analyzed



Note: Base map prepared from Wessex Inc., US Streets and Boundaries, Release 4.0
Alameda/Santa Clara/San Mateo Counties,
11 Lafayette St., Lebanon, NH, 03766, dated 1997.

Santa Clara Valley Water District
Pilot Study Sites

Santa Clara Valley Water District

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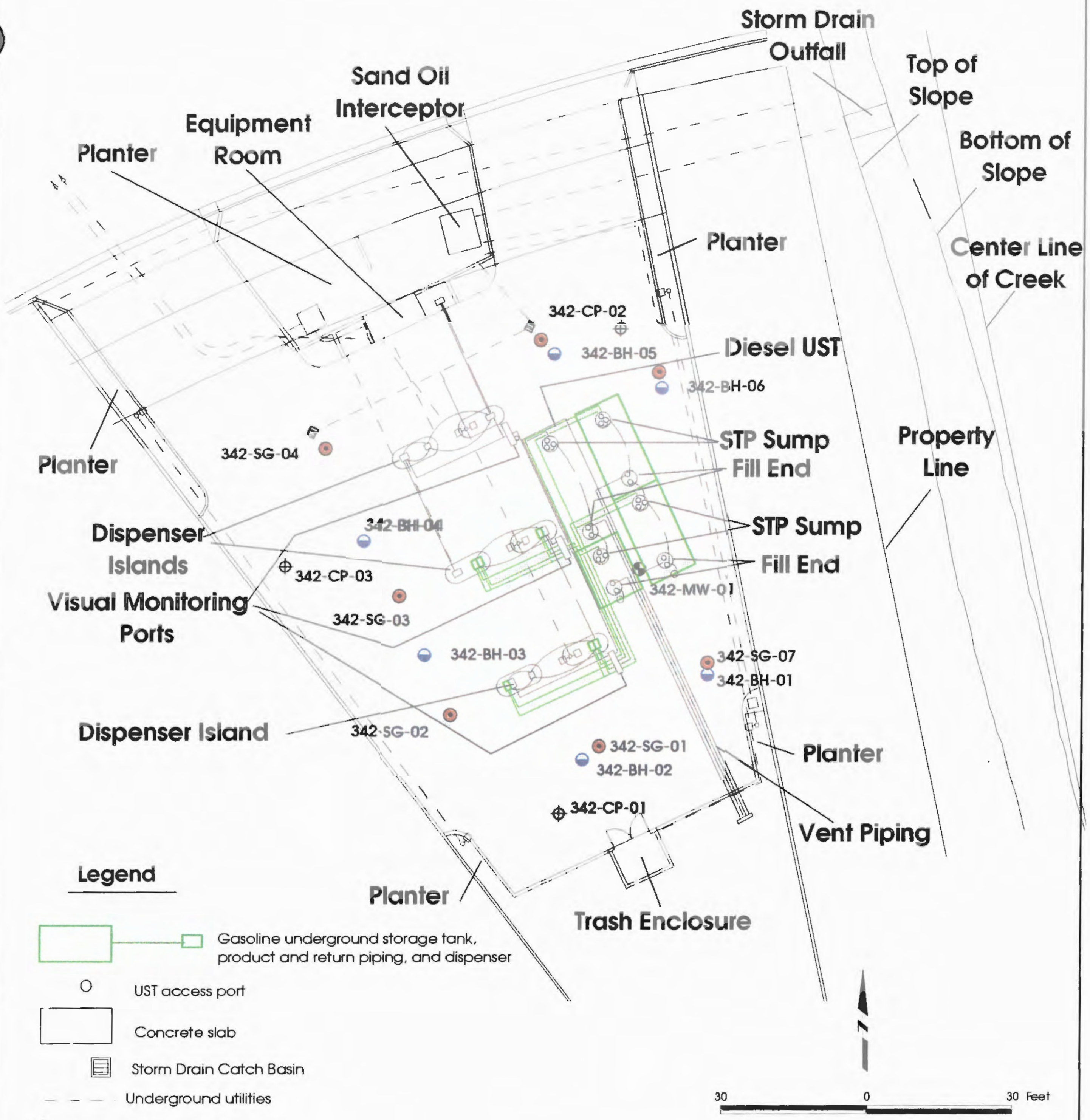
Figure 1



Legend

🟩 Gasoline underground storage tank, product and return piping, and dispenser

○ UST access port

☐ Concrete slab

▤ Storm Drain Catch Basin

— — Underground utilities

◕ Groundwater monitoring well

◒ Soil and groundwater sampling location

● Soil-gas sampling location

⊕ Cone-penetrometer test location

STP - Submersible Turbine Pump

Note: Base map prepared from Petroleum Site Plan, Sheet PE-1 (dated 8/8/90 and revised6/20/91) and Grading Plan, Sheet SD-3 (dated 8/8/90 and revised 10/22/90, 2/11/91, 6/20/91), Card Lock Fueling Facility, Ames Avenue, Milpitas, CA, Walton Engineering Sacramento, CA (dated 8/8/90).

Site #342

Site Plan

Santa Clara Valley Water District

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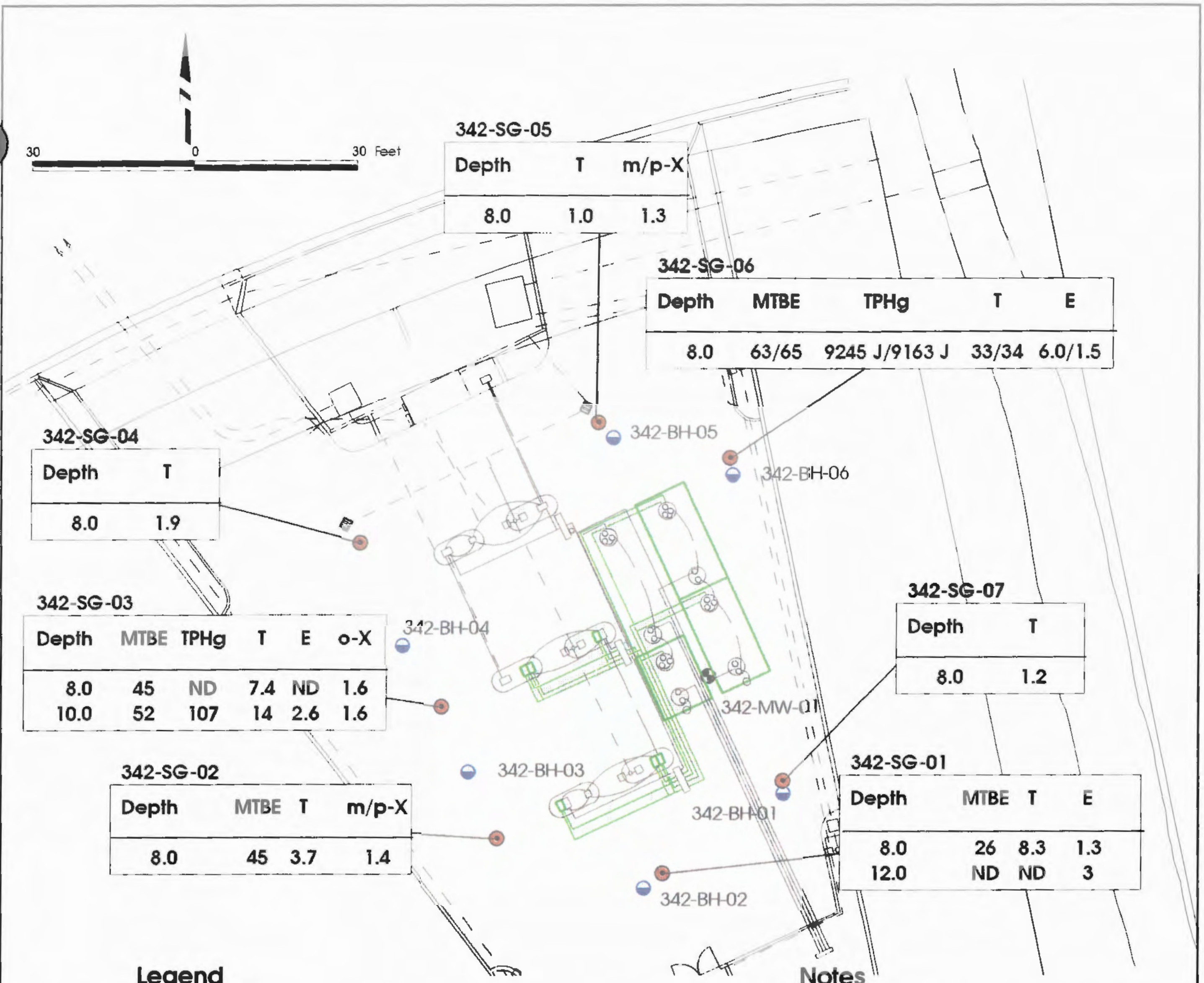
Figure 2



342-SG-05

Depth	T	m/p-X
8.0	1.0	1.3

342-SG-06

Depth	MTBE	TPHg	T	E
8.0	63/65	9245 J/9163 J	33/34	6.0/1.5

342-SG-04

Depth	T
8.0	1.9

342-SG-03

Depth	MTBE	TPHg	T	E	o-X
8.0	45	ND	7.4	ND	1.6
10.0	52	107	14	2.6	1.6

342-SG-07

Depth	T
8.0	1.2

342-SG-02

Depth	MTBE	T	m/p-X
8.0	45	3.7	1.4

342-SG-01

Depth	MTBE	T	E
8.0	26	8.3	1.3
12.0	ND	ND	3

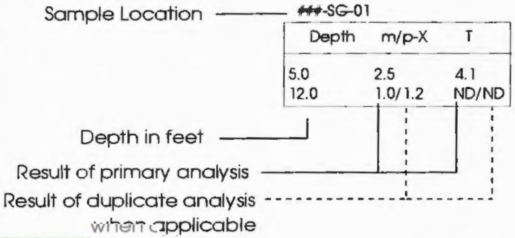
Legend

◐ Groundwater monitoring well

● Soil-gas sampling location

◒ Soil and groundwater sampling location

The following represents a hypothetical sampling point and defines the characters associated with that point:


Sample Location
###-SG-01
Depth in feet
Result of primary analysis
Result of duplicate analysis when applicable

Depth	m/p-X	T
5.0	2.5	4.1
12.0	1.0/1.2	ND/ND

🟩 Gasoline underground storage tank, product and return piping, and dispenser

○ UST access port

▭ Concrete slab

▤ Storm Drain

— — — Underground utilities

See Figure 2 for description of site features and origin of base map.

Notes

Concentrations of analytes detected are presented; analytes not detected are not presented or are presented as ND (not detected). MTBE and BTEX were analyzed using EPA Method 8020 and TPHg was analyzed suing Modified EPA Method 8015.

Results in micrograms/liter (ug/L)
RL = Reporting Limit
J = Estimated value

Each sample was analyzed for the following:

MTBE = Methyl Tertiary Butyl Ether (RL = 5 ug/L)
TPHg = Total Petroleum Hydrocarbons as Gasoline (RL = 100 ug/L)
B = Benzene (RL = 1 ug/L)
T = Toluene (RL = 1 ug/L)
E = Ethyl Benzene (RL = 1 ug/L)
m/p-X = meta/para-Xylenes (RL = 1 ug/L)
o-X = ortho-Xylene (RL = 1 ug/L)

Site #342

Summary of Chemical Analysis Results for Soil-Gas Samples

Santa Clara Valley Water District

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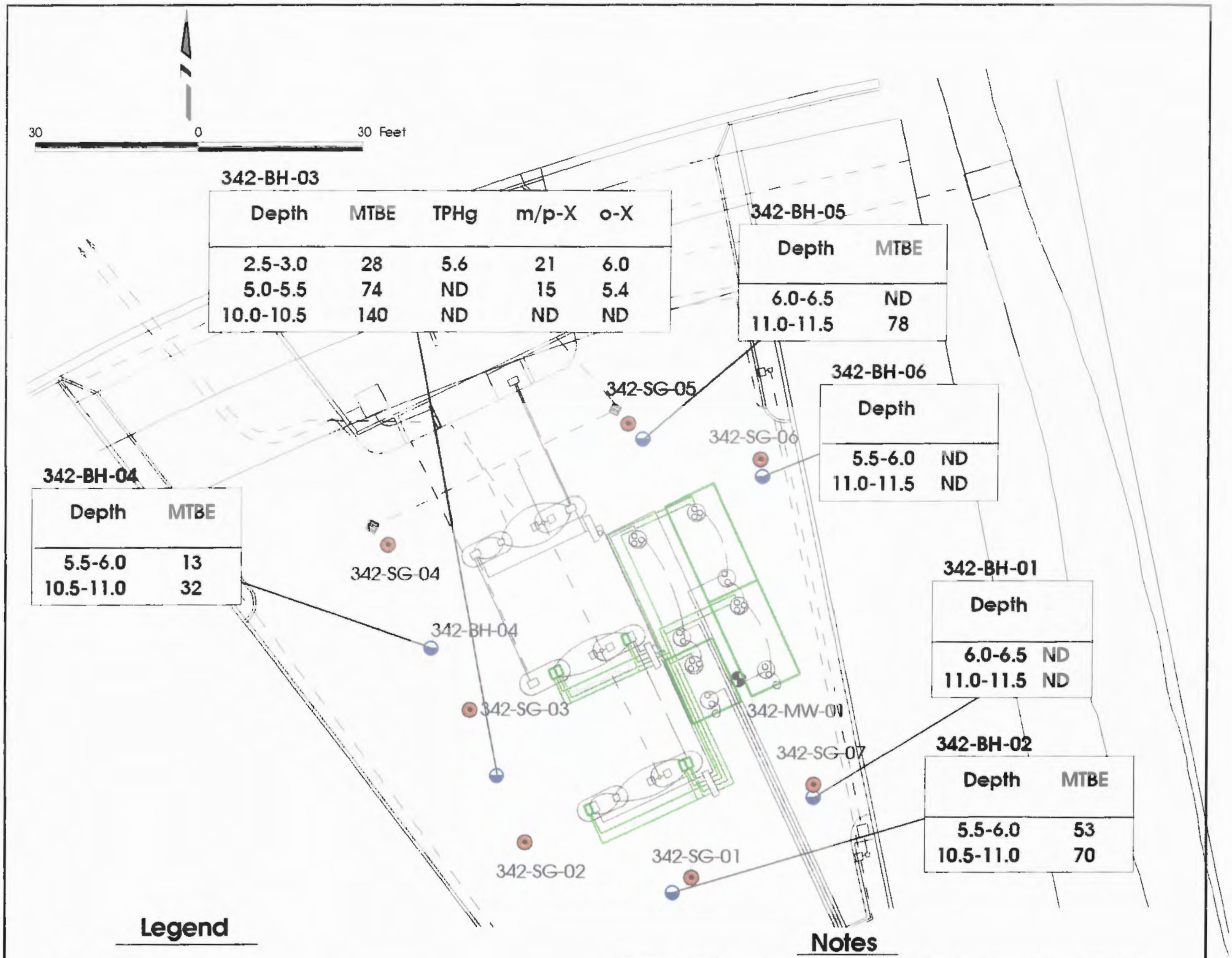
Figure 3



342-BH-03

Depth	MTBE	TPHg	m/p-X	o-X
2.5-3.0	28	5.6	21	6.0
5.0-5.5	74	ND	15	5.4
10.0-10.5	140	ND	ND	ND

342-BH-05

Depth	MTBE
6.0-6.5	ND
11.0-11.5	78

342-BH-06

Depth	
5.5-6.0	ND
11.0-11.5	ND

342-BH-04

Depth	MTBE
5.5-6.0	13
10.5-11.0	32

342-BH-01

Depth	
6.0-6.5	ND
11.0-11.5	ND

342-BH-02

Depth	MTBE
5.5-6.0	53
10.5-11.0	70

Legend

⊕ Groundwater monitoring well

◒ Soil and groundwater sampling location

● Soil-gas sampling location

The following represents a hypothetical sampling point and defines the characters associated with that point:

Sample Location ——— ###-BH-01

12.0-12.5	5.1/5.3	ND/ND

Depth in feet

Result of primary analysis

Result of duplicate analysis when applicable

🟩 Gasoline underground storage tank, product and return piping, and dispenser

○ UST access port

☐ Concrete slab

▤ Storm Drain

— — — Underground utilities

See Figure 2 for description of site features and origin of base map.

Notes

Concentrations of analytes detected are presented; analytes not detected are not presented or are presented as ND (not detected). TPHg was analyzed using Modified EPA Method 8015, all other analytes were analyzed using EPA Method 8260.

Results in micrograms/kilogram (ug/Kg) for all compounds except TPHg which is presented in milligrams/kilogram (mg/Kg).

RL = Reporting Limit

Each sample was analyzed for the following:

MTBE = Methyl Tertiary Butyl Ether (RL = 5 ug/Kg)
TPHg = Total Petroleum Hydrocarbons as Gasoline (RL = 1 mg/Kg)
B = Benzene (RL = 5 ug/Kg)
T = Toluene (RL = 5 ug/Kg)
E = Ethyl Benzene (RL = 5 ug/Kg)
m/p-X = meta/para-Xylenes (RL = 5 ug/Kg)
o-X = ortho-Xylene (RL = 5 ug/Kg)
DIPE = Di-isopropyl Ether (RL = 20 ug/Kg)
ETBE = Ethyl Tertiary Butyl Ether (RL = 20 ug/Kg)
TAME = Tertiary Amyl Methyl Ether (RL = 20 ug/Kg)
TBA = Tertiary Butyl Alcohol (RL = 200 ug/Kg)

Site #342

Summary of Chemical Analysis Results for Soil Samples

Santa Clara Valley Water District

LFR
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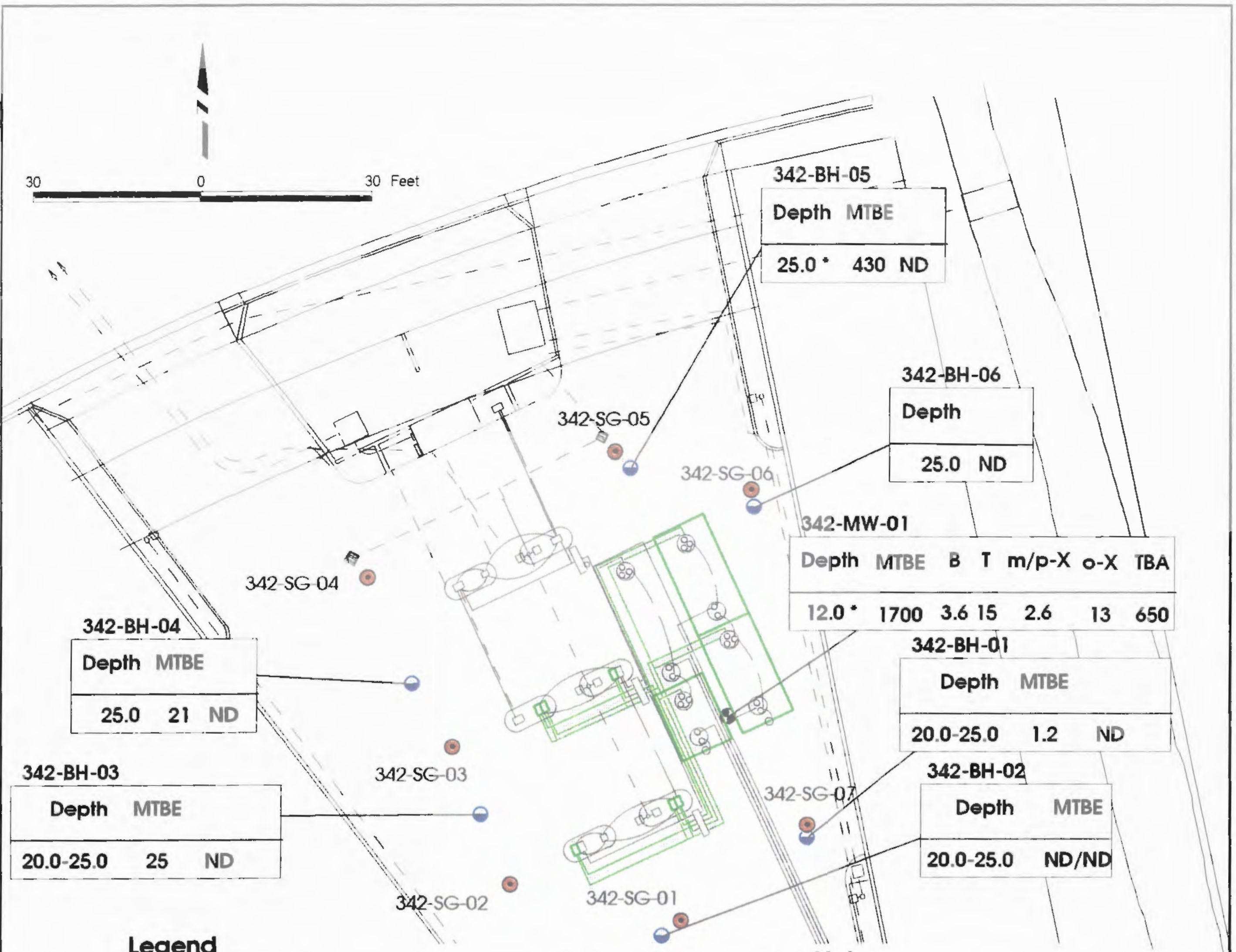
Figure 4



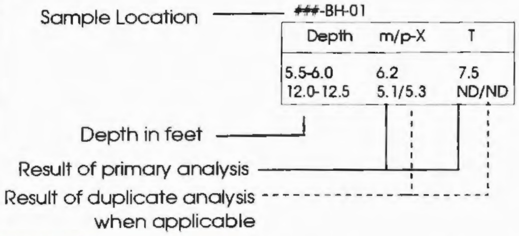
Legend

◐ Groundwater monitoring well

◓ Soil and groundwater sampling location

● Soil-gas sampling location

The following represents a hypothetical sampling point and defines the characters associated with that point:



🟩 Gasoline underground storage tank, product and return piping, and dispenser

O UST access port

▭ Concrete slab

▤ Storm Drain

— — — Underground utilities

See Figure 2 for description of site features and origin of base map.

Notes

Concentrations of analytes detected are presented; analytes not detected are not presented or are presented as ND (not detected). TPHg was analyzed using Modified EPA Method 8015, all other analytes were analyzed using EPA Method 8260.

Results in micrograms/liter (ug/L) for all compounds except TPHg which is presented in milligrams/liter (mg/L).

RL = Reporting Limit

* Indicates elevated RL (see results table for reporting limits)

Each sample was analyzed for the following:

MTBE = Methyl Tertiary Butyl Ether (RL = 0.5 ug/L)
TPHg = Total Petroleum Hydrocarbons as Gasoline (RL = 0.05 mg/L)
B = Benzene (RL = 0.5 ug/L)
T = Toluene (RL = 0.5 ug/L)
E = Ethyl Benzene (RL = 0.5 ug/L)
m/p-X = meta/para-Xylenes (RL = 0.5 ug/L)
o-X = ortho-Xylene (RL = 0.5 ug/L)
DIPE = Di-isopropyl Ether (RL = 1 ug/L)
ETBE = Ethyl Tertiary Butyl Ether (RL = 1 ug/L)
TAME = Tertiary Amyl Methyl Ether (RL = 1 ug/L)
TBA = Tertiary Butyl Alcohol (RL = 10 ug/L)

Site #342

Summary of Chemical Analysis Results for Groundwater Samples

Santa Clara Valley Water District

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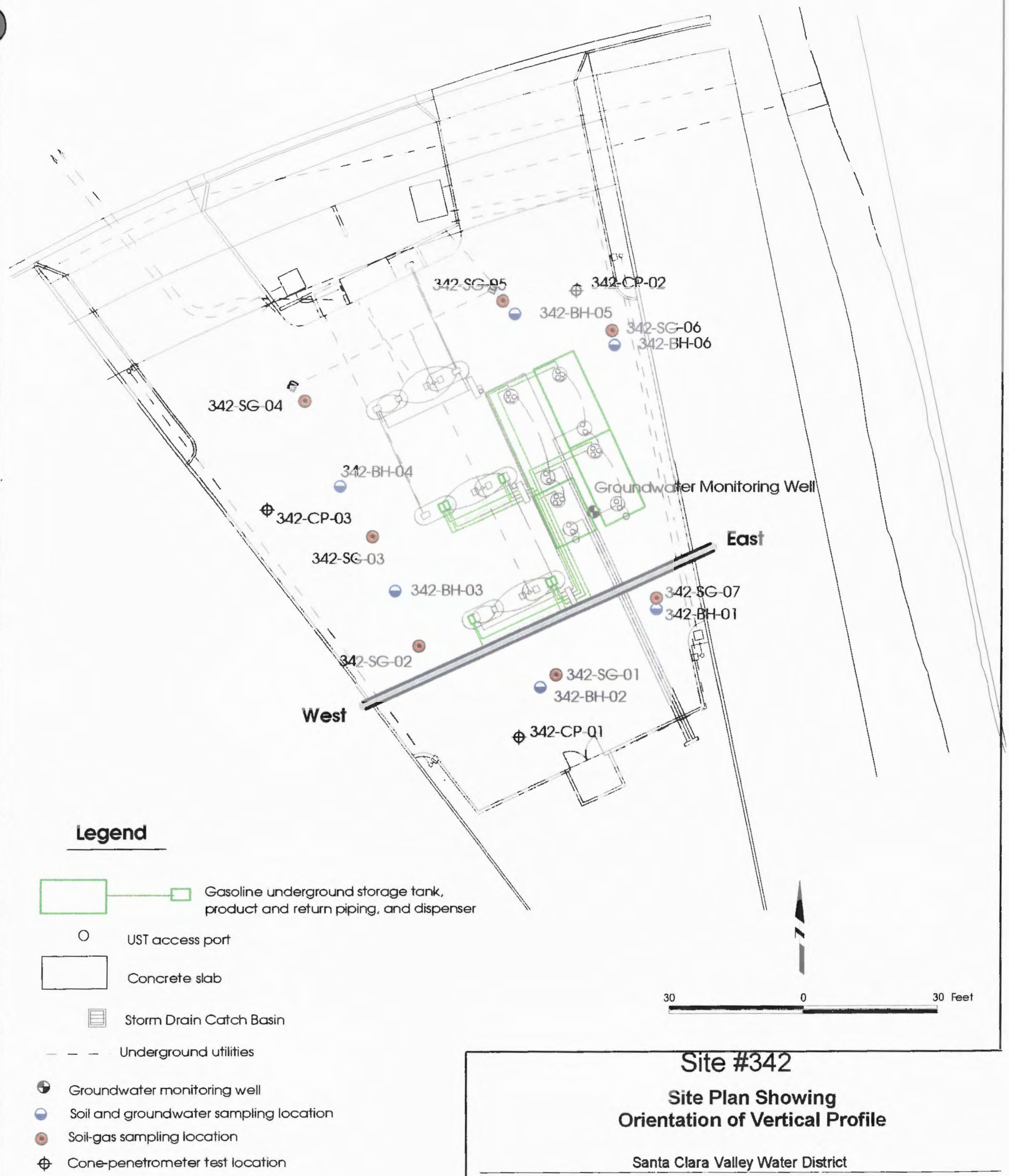
Figure 5



See Figure 2 for description of site features and origin of base map.

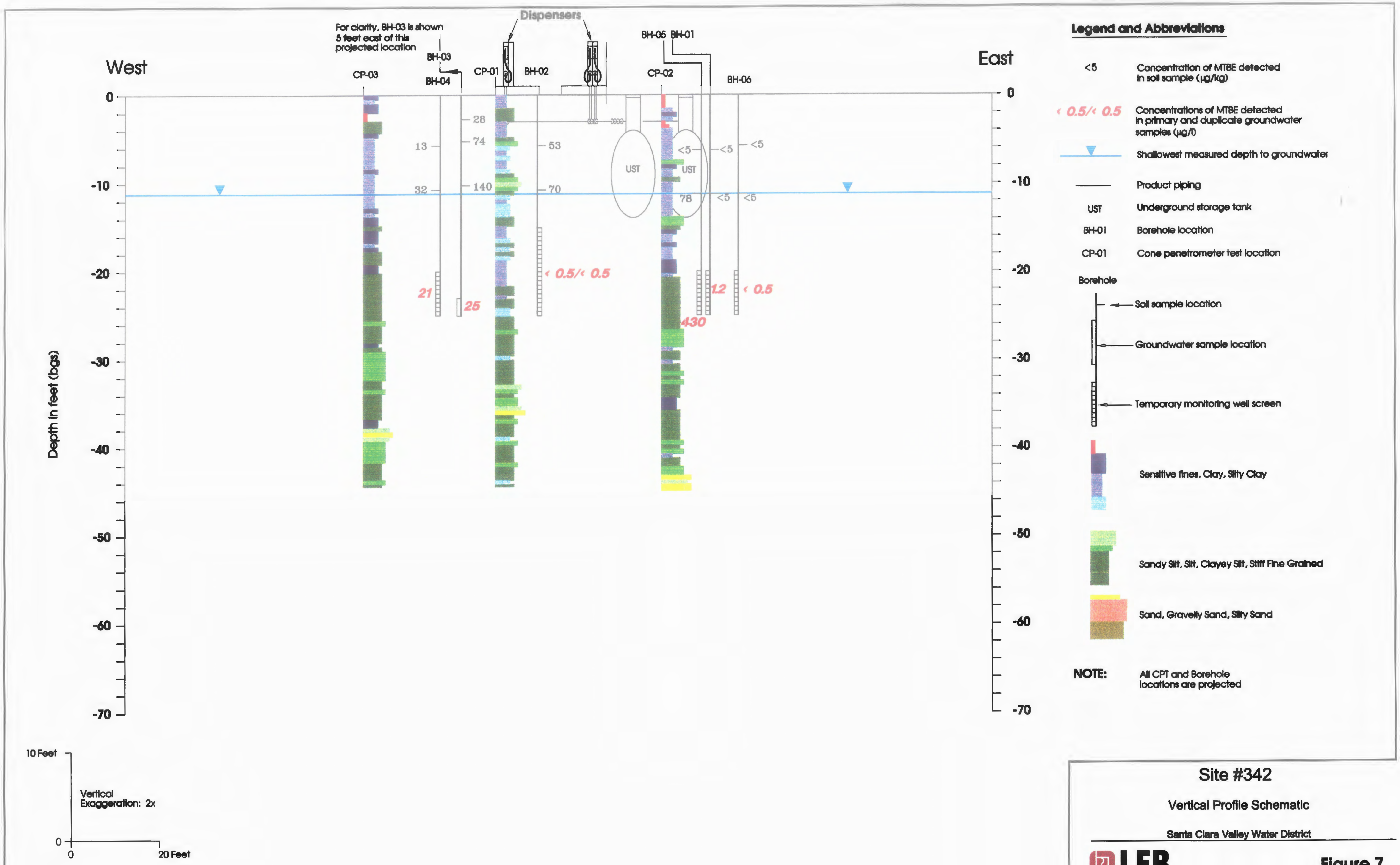
Site #342

Site Plan Showing Orientation of Vertical Profile

Santa Clara Valley Water District

LFR LEVINE•FRICKE

Figure 6


West
East
Dispensers
For clarity, BH-03 is shown 5 feet east of this projected location
CP-03
BH-03
BH-04
CP-01
BH-02
BH-05
BH-01
CP-02
BH-06
0
-10
-20
-30
-40
-50
-60
-70
Depth in feet (bgs)
28
74
13
53
140
32
70
<5
<5
<5
UST
UST
78
<5
<5
21
25
‹ 0.5/‹ 0.5
1.2
‹ 0.5
430
Legend and Abbreviations
<5
Concentration of MTBE detected in soil sample (µg/kg)
‹ 0.5/‹ 0.5
Concentrations of MTBE detected in primary and duplicate groundwater samples (µg/l)
Shallowest measured depth to groundwater
Product piping
UST
Underground storage tank
BH-01
Borehole location
CP-01
Cone penetrometer test location
Borehole
Soil sample location
Groundwater sample location
Temporary monitoring well screen
Sensitive fines, Clay, Silty Clay
Sandy Silt, Silt, Clayey Silt, Stiff Fine Grained
Sand, Gravelly Sand, Silty Sand
NOTE:
All CPT and Borehole locations are projected
10 Feet
0
0
20 Feet
Vertical Exaggeration: 2x

Site #342

Vertical Profile Schematic

Santa Clara Valley Water District

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Figure 7

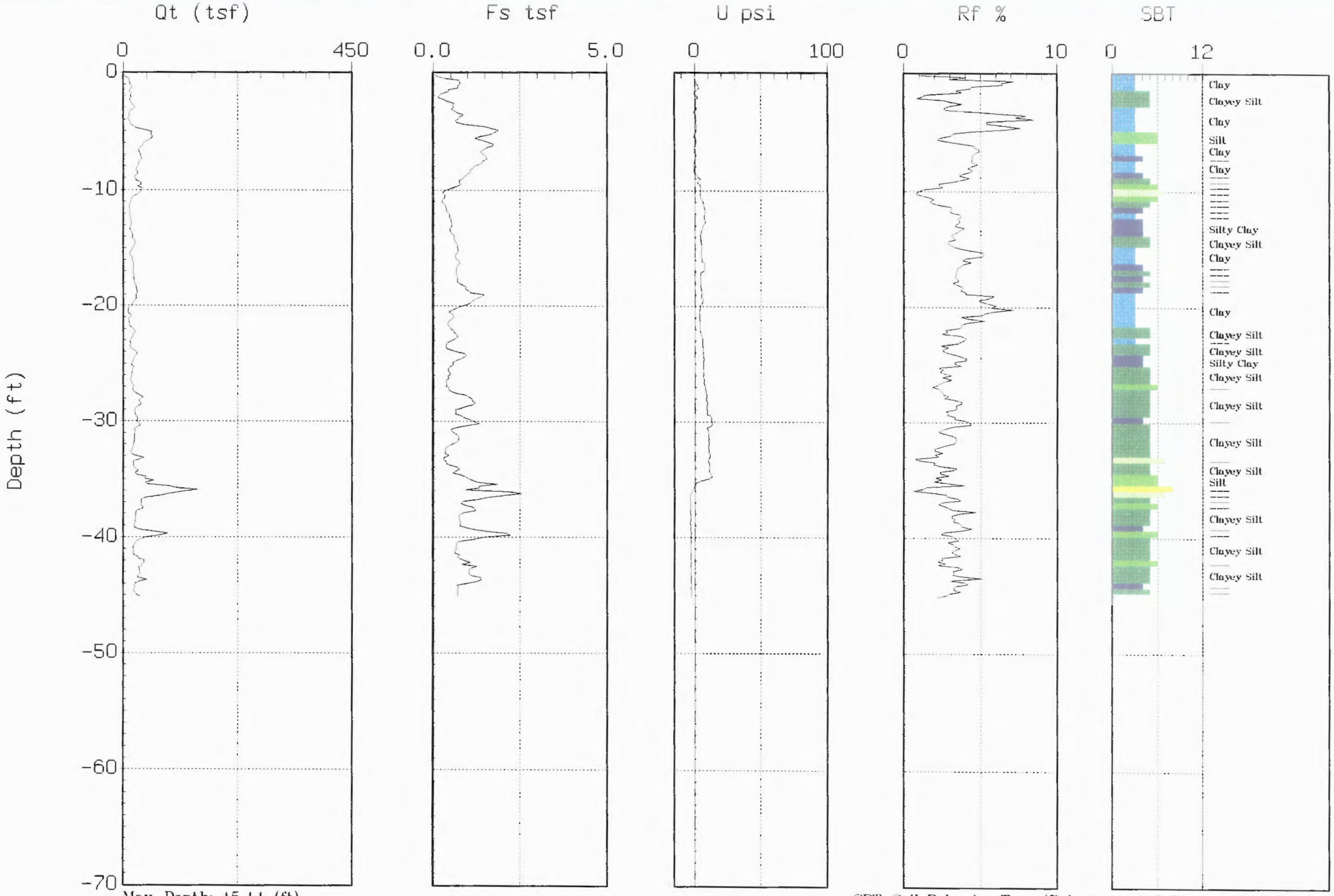
J:\ENGCAD\6730\CM#342.DWG 03/11/99 CM#505.PCP

GREGG

LFR LEVINE.FRICKE

Site: 342 OLYMPIAN OIL
Location : 342-CP-01

Geologist: T. BENNETT
Date : 12:28:98 11:00



Max. Depth: 45.11 (ft)

Depth Inc.: 0.164 (ft)

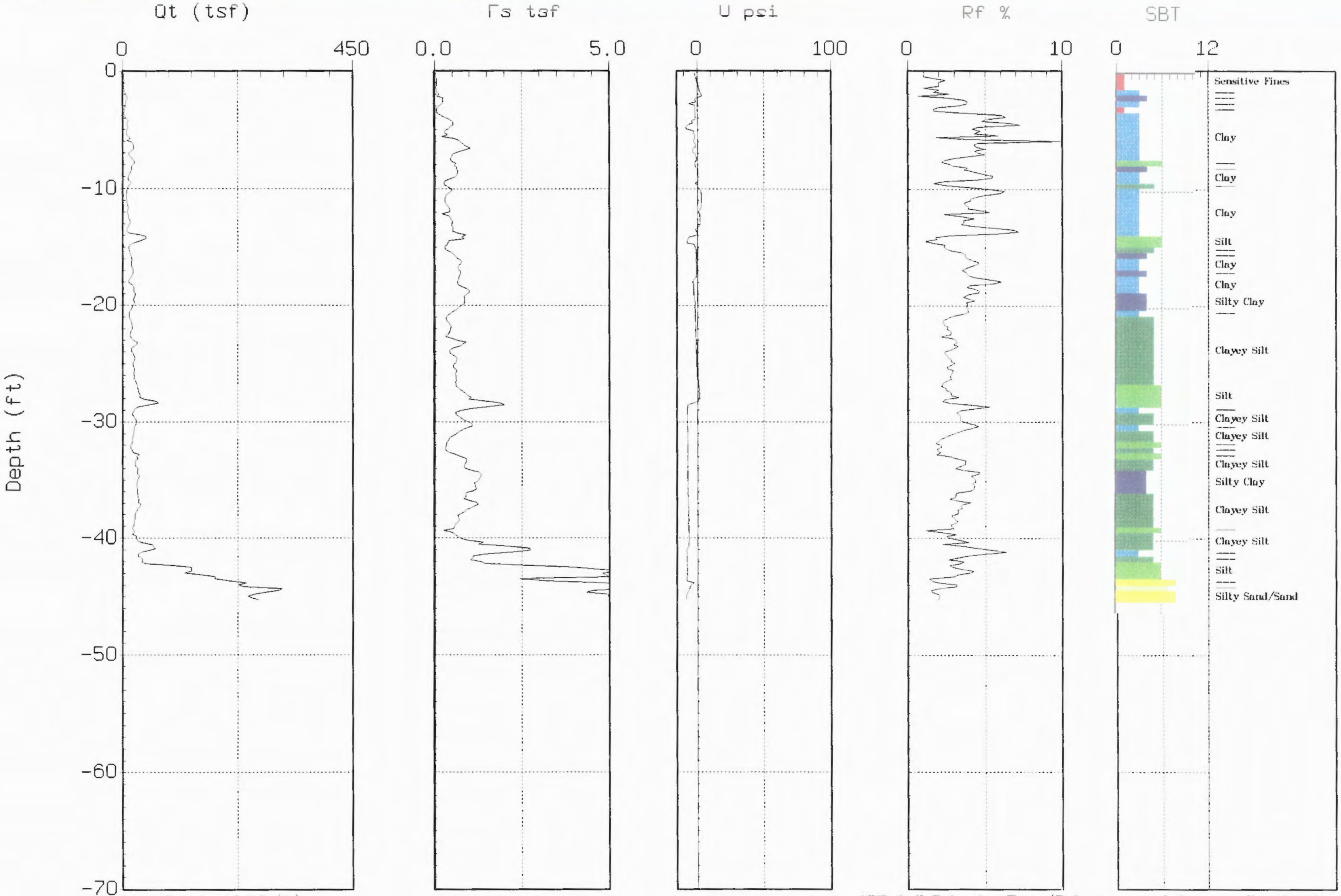
SBT: Soil Behavior Type (Robertson and Campanella 1988)

GREGG

LFR LEVINE.FRICKE

Site: 342 OLYMPIAN OIL
Location : 342-CP-02

Geologist: T. BENNETT
Date : 12:28:98 12:45



Max. Depth: 45.28 (ft)

Depth Inc.: 0.164 (ft)

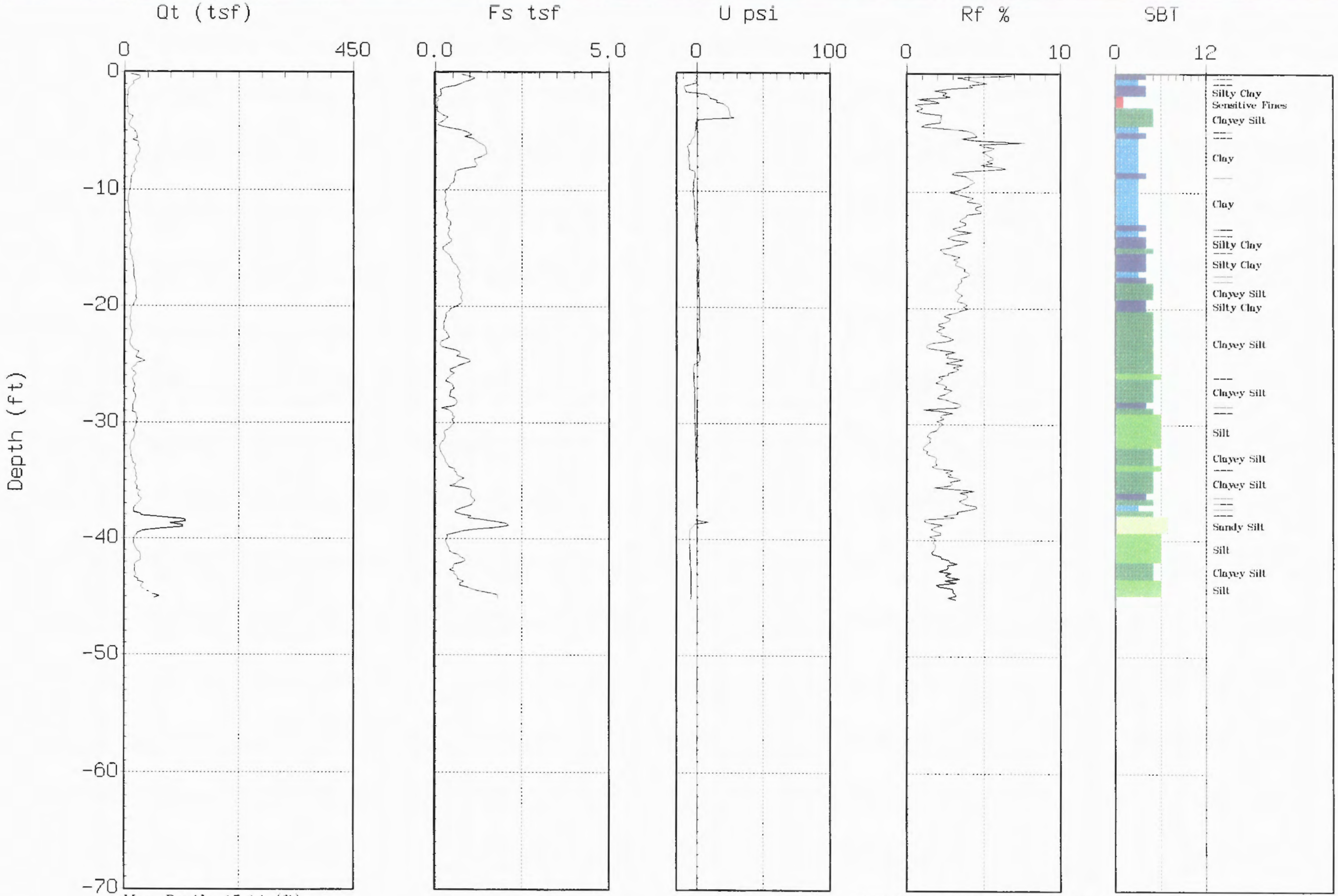
SBT: Soil Behavior Type (Robertson and Campanella 1988)

GREGG

LFR LEVINE.FRICKE

Site: 342 OLYMPIAN OIL
Location : 342-CP-03

Geologist: T. BENNETT
Date : 12:28:98 13:51



Max. Depth: 45.11 (ft)

Depth Inc.: 0.164 (ft)

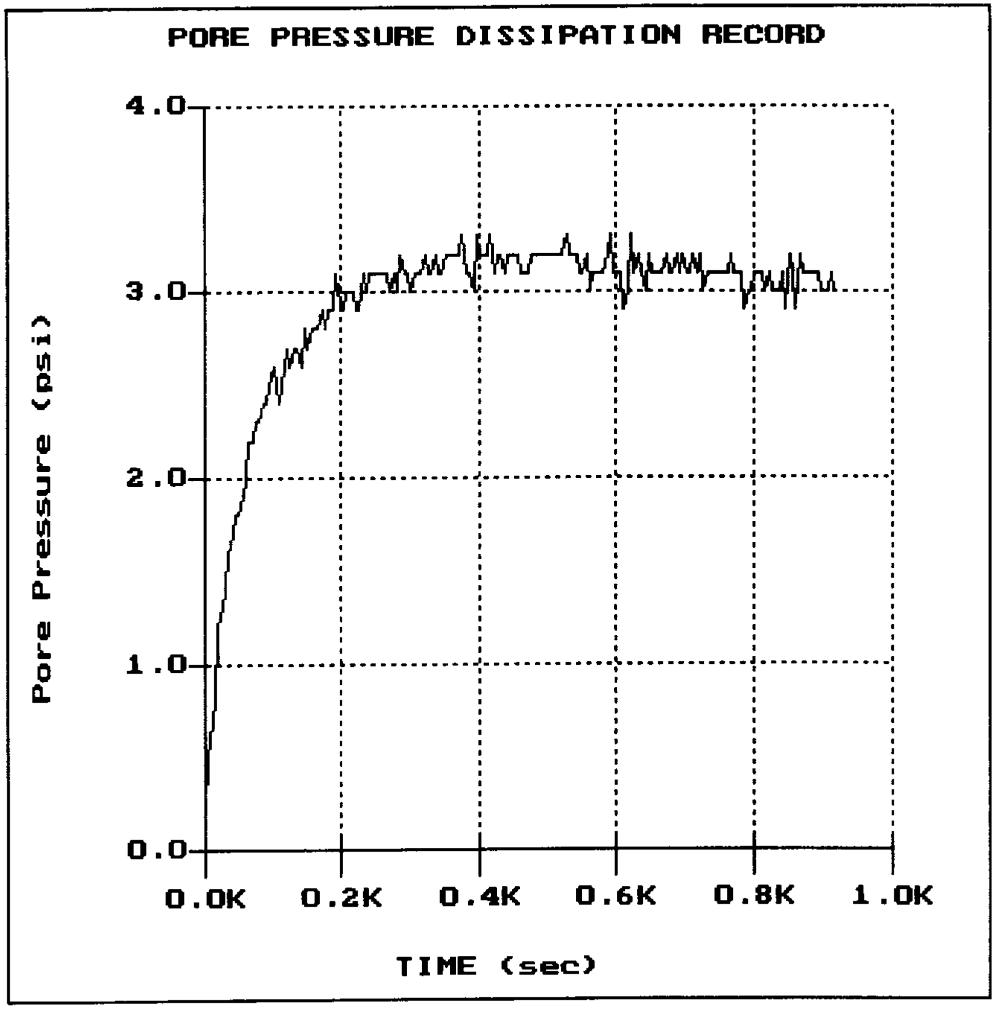
SBT: Soil Behavior Type (Robertson and Campanella 1988)

LFR LEVINE FRICKE

Hole:342-CP-02
Location:342 OLYMP. OIL

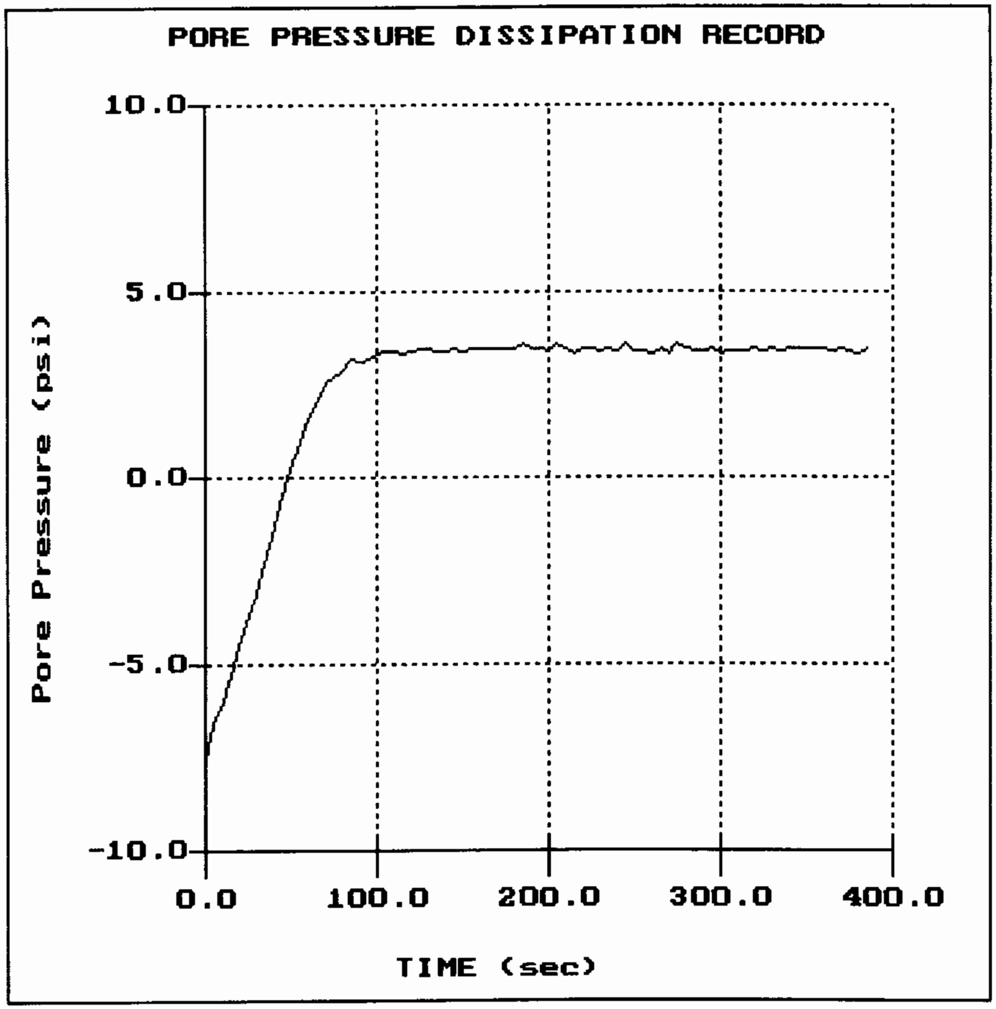
Cone:20 TON AD071
Date:12:28:98 12:45

File: 14534202.PPR
Depth (m): 3.00
(ft): 9.84
Duration : 915.0s
U-min: 0.20 0.0s
U-max: 3.30 620.0s



LFR LEVINE FRICKE

Hole:342-CP-02 Cone:20 TON AD071
Location:342 OLYMP. OIL Date:12:28:98 12:45

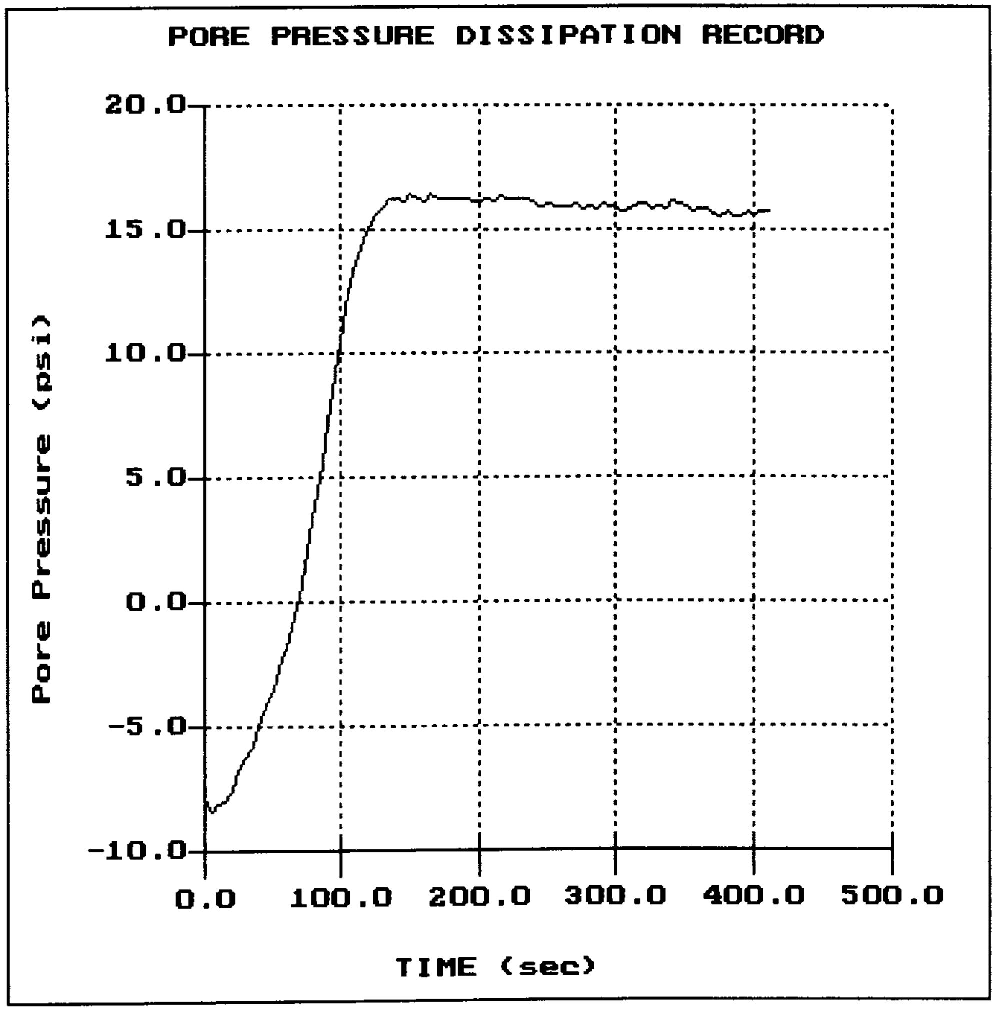


File: 14534202.PPR
Depth (m): 4.45
(ft): 14.60
Duration : 385.0s
U-min: -7.60 0.0s
U-max: 3.60 275.0s

LFR LEVINE FRICKE

Hole:342-CP-02
Location:342 OLYMP. OIL

Cone:20 TON AD071
Date:12:28:98 12:45



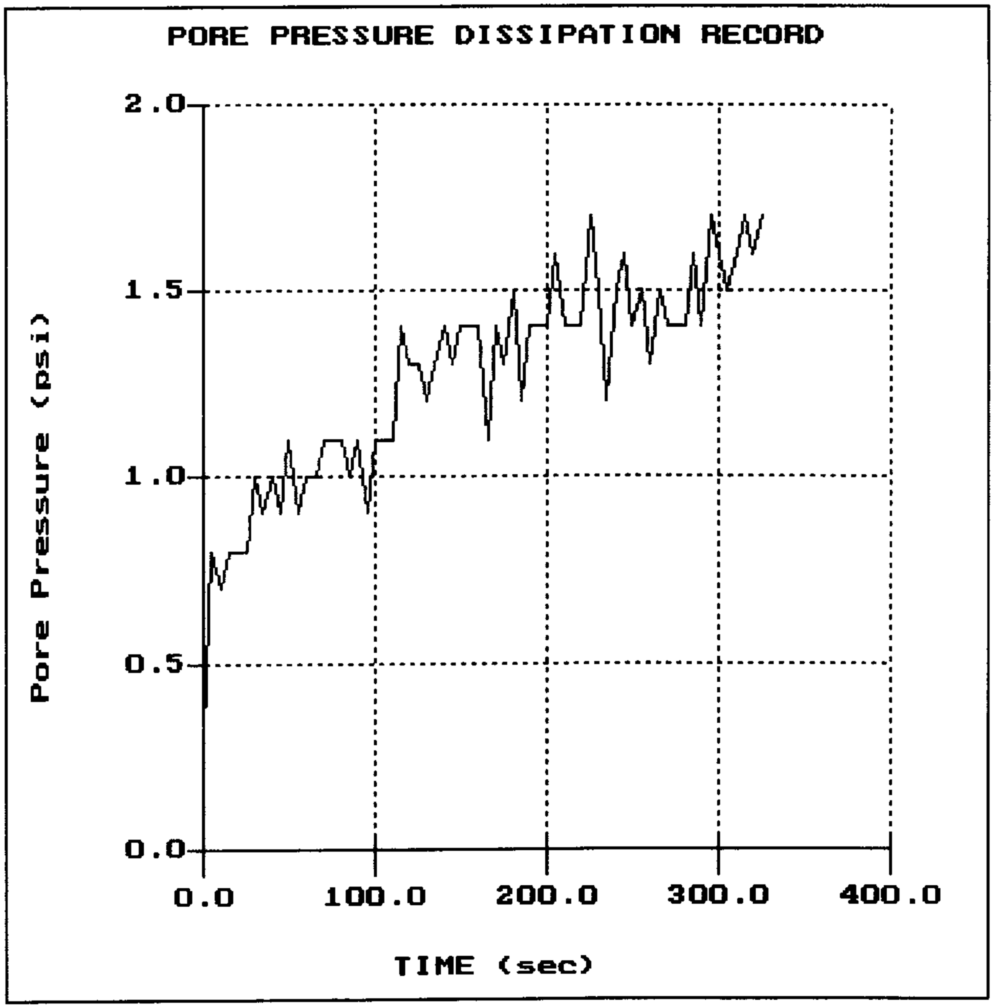
File: 14534202.PPR
Depth (m): 13.30
(ft): 43.64
Duration : 410.0s
U-min: -8.40 5.0s
U-max: 16.50 165.0s

LFR LEVINE FRICKE

Hole:342-CP-03
Location:342 OLYMP. OIL

Cone:20 TON AD071
Date:12:28:98 13:51

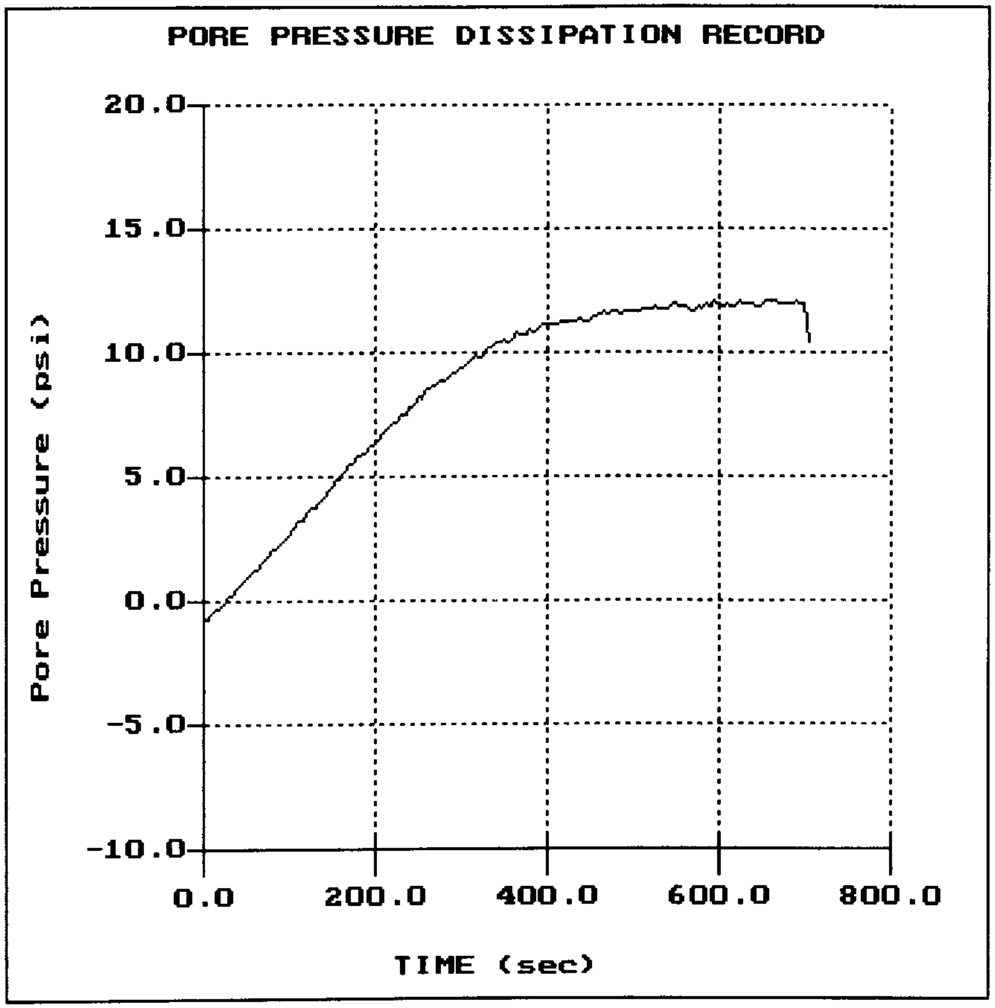
File: 14534203.PPR
Depth (m): 4.70
(ft): 15.42
Duration : 325.0s
U-min: 0.30 0.0s
U-max: 1.70 325.0s



LFR LEVINE FRICKE

Hole:342-CP-03
Location:342 OLYMP. OIL

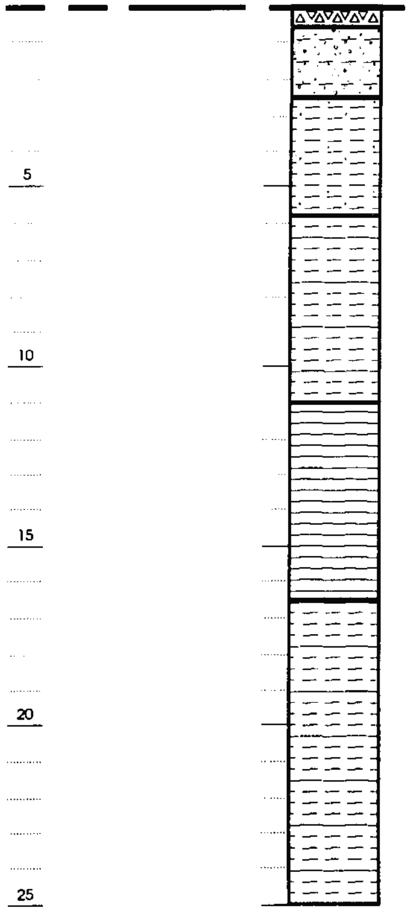
Cone:20 TON AD071
Date:12:28:98 13:51



File: 14534203.PPR
Depth (m): 11.70
(ft): 38.39
Duration : 705.0s
U-min: -0.70 5.0s
U-max: 12.10 690.0s

SCVWD PILOT STUDY

Depth, feet | Water Level | PID Reading (ppm) | Graphic Log | Lithologic Description | Sample Interval



CONCRETE Pavement.

SILTY GRAVEL to GRAVELLY SILT (GM-SM), dark gray to very dark gray, mixed with dark brown.

SANDY SILT (SM), dark brown, slightly moist, medium dense, some gravel.

CLAYEY SILT (ML), dark brown, slightly moist, medium stiff, medium plasticity, some fine sand and gravel.

CLAY (CL), dark gray to very dark gray, slightly moist, medium stiff, medium plasticity.

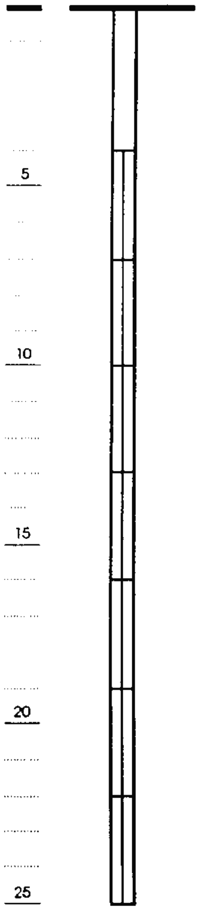
CLAY (CL), very dark gray, slightly moist, stiff, medium plasticity, some sand.

CLAYEY SILT (ML), brown, slightly moist, medium stiff, medium plasticity, some sand and gravel.

Moist to wet.

Increased gravel and sand.

BOTTOM OF BORING AT 25 FEET.



No. 6650

Exp. 4/30/01

Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: January 18, 1999
LFR Geologist: Thomas Zakaria, R.G., CH.G.

EXPLANATION

- ▤ Clay
- ▥ Silt
- ░ Sand
- ▒ Gravel

PID - Photoionization Detector

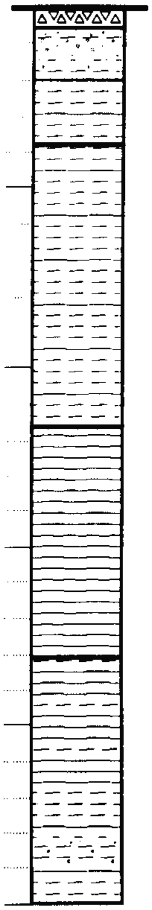
▼ Water level at time of drilling

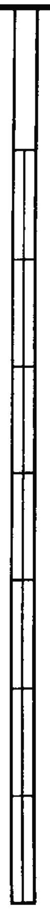
LFR LEVINE·FRICKE

LITHOLOGY FOR 342-BH-01 *(page 1 of 1)*

Project No. 6730.00-024

SCVWD PILOT STUDY





Depth, feet	Water Level	PID Reading (ppm)	Graphic Log	Lithologic Description	Sample Interval
				CONCRETE Pavement.	
				SILTY GRAVEL-GRAVELLY SILT/Fill.	
				CLAYEY SILT (ML), very dark gray, slightly moist, medium stiff, sandy.	
5				CLAYEY SILT (ML), grayish brown to brown, slightly moist, medium stiff, low plasticity, thin sand interbeds.	5
10				Increased clay.	10
				CLAY (CL), very dark gray, slightly moist, medium stiff, high plasticity, minor sand.	
15				Sandy interbed.	15
				SILTY CLAY-CLAYEY SILT (CL-ML), brown, slightly moist, medium stiff, high plasticity.	
20					20
				More moist to wet.	
				Sandy and gravelly as imbedded.	
25				BOTTOM OF BORING AT 25 FEET.	25
30					30
35					35

JENIFER J. BEATTY
No. 6650
Exp. 4/30/01

Drilling Method:	Dual-Tube/Direct Push
Drilling Company:	Precision
Date Well Drilled:	January 18, 1999
LFR Geologist:	Thomas Zakaria, R.G., CH.G.

EXPLANATION

▤ Clay

▥ Silt

░ Sand

▒ Gravel

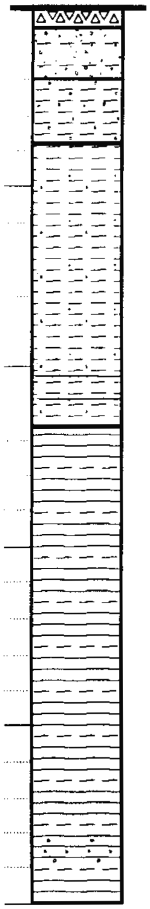
PID - Photoionization Detector

▼ Water level at time of drilling

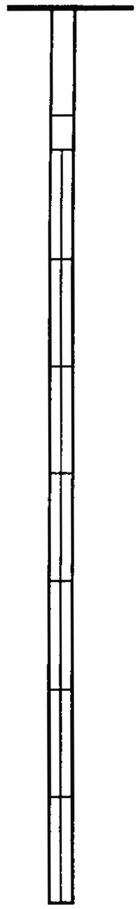
SCVWD PILOT STUDY

Depth, feet	Water Level	PID Reading (ppm)	Lithologic Description
			CONCRETE Pavement.
			SILTY GRAVEL/Fill.
			GRAVELLY SILT (ML), very dark gray, slightly moist, medium dense.
		0.3	
5		0.1	SANDY SILT (ML), brown, slightly moist, soft to medium stiff, low plasticity.
		0.0	
			Sandy interbeds, some gravel.
10		0.0	Increased clay.
			SILTY CLAY (CL), very dark gray to black, slightly moist, stiff, medium plasticity.
		0.0	
15			
		0.0	
			SILTY CLAY (CL), brown, stiff, medium plasticity.
		0.0	
20			Wet, soft.
		0.0	
			Gravelly interbeds, very dense
25		0.0	BOTTOM OF BORING AT 25 FEET.
30			
35			

Graphic Log



Sample Interval



No. 6650
Exp. 9/30/[illegible]
STATE OF CALIFORNIA

Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: January 18, 1999
LFR Geologist: Thomas Zakaria, R.G., CH.G.

EXPLANATION

- ▤ Clay
- ▭ Silt
- ░ Sand
- ▒ Gravel

PID - Photoionization Detector

▼ Water level at time of drilling

LFR
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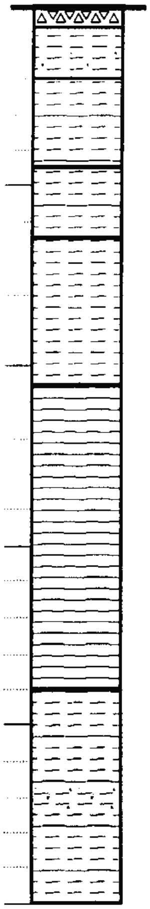
LITHOLOGY FOR 342-BH-03 *(page 1 of 1)*

Project No. 6730.00-024

SCVWD PILOT STUDY



Depth, feet	Water Level	PID Reading (ppm)	Lithologic Description	Sample Interval
			CONCRETE Pavement.	
			GRAVELLY SILT/Fill.	
			CLAYEY SILT (ML), very dark gray to black, moist, medium stiff, medium plasticity.	
5			CLAYEY SILT (ML), dark gray, slightly moist, medium stiff, medium plasticity.	5
			SANDY SILT (ML), grayish brown to brown, slightly moist, medium stiff, low plasticity, fine to medium sand.	
10				10
			SILTY CLAY (CL), very dark gray to black, moist, stiff, medium plasticity.	
15			Color change to very dark grayish brown, more stiff, medium to high plasticity.	15
			Color grades to grayish brown, includes fine gravel.	
20			CLAYEY SILT (CL-ML), brown, moist, soft to medium stiff, medium plasticity, gravelly sand interbeds.	20
25			BOTTOM OF BORING AT 25 FEET.	25
30				30
35				35

No. 6650
Exp. 4/30/01

EXPLANATION
- ☰ Clay
- ▤ Silt
- ░ Sand
- ▒ Gravel

PID - Photoionization Detector

▼ Water level at time of drilling

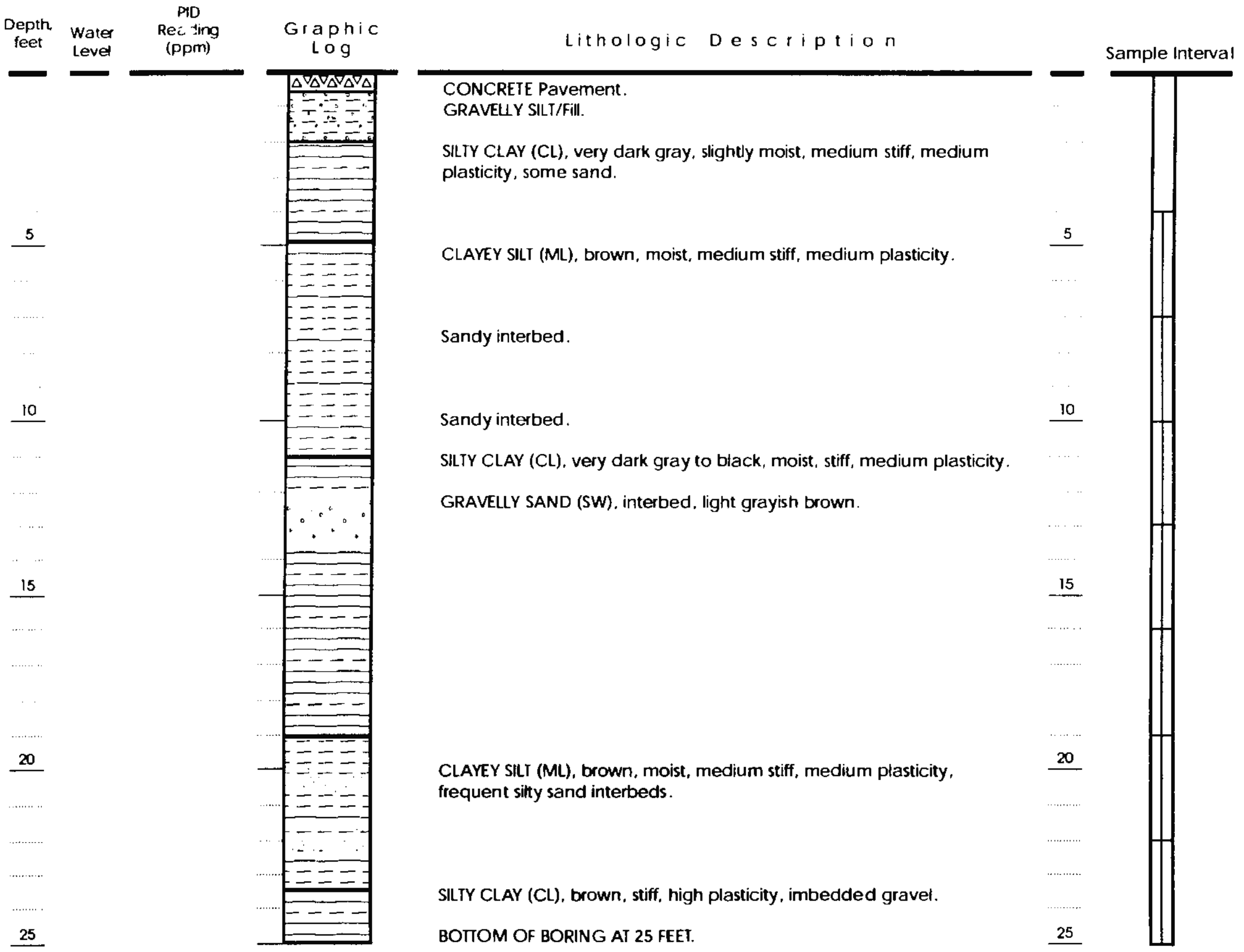
Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: January 19, 1999
LFR Geologist: Thomas Zakaria, R.G., CH.G.

LFR
LEVINE•FRICKE

LITHOLOGY FOR 342-BH-04 *(page 1 of 1)*

Project No. 6730.00-024

SCVWD PILOT STUDY



CONCRETE Pavement.

GRAVELLY SILT/Fill.

SILTY CLAY (CL), very dark gray, slightly moist, medium stiff, medium plasticity, some sand.

CLAYEY SILT (ML), brown, moist, medium stiff, medium plasticity.

Sandy interbed.

Sandy interbed.

SILTY CLAY (CL), very dark gray to black, moist, stiff, medium plasticity.

GRAVELLY SAND (SW), interbed, light grayish brown.

CLAYEY SILT (ML), brown, moist, medium stiff, medium plasticity, frequent silty sand interbeds.

SILTY CLAY (CL), brown, stiff, high plasticity, imbedded gravel.

BOTTOM OF BORING AT 25 FEET.

No. 6600
Exp 9/30/01

Drilling Method:	Dual-Tube/Direct Push
Drilling Company:	Precision
Date Well Drilled:	January 19, 1999
LFR Geologist:	Thomas Zakaria, R.G., CH.G.

EXPLANATION

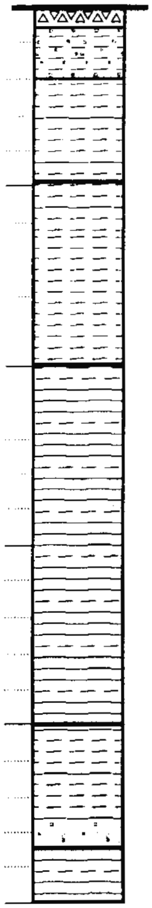
☰	Clay
┅	Silt
⬚	Sand
▨	Gravel

PID - Photoionization Detector

▼ Water level at time of drilling

SCVWD PILOT STUDY

Depth, feet | Water Level | PID Reading (ppm) | Graphic Log | Lithologic Description | Sample Interval



CONCRETE Pavement.
GRAVELLY SILT/Fill.

CLAYEY SILT (ML-CL), very dark gray to black, moist, medium stiff, medium plasticity.

CLAYEY SILT to SANDY SILT (ML), brown, slightly moist, medium stiff, low plasticity.

Increased clay.

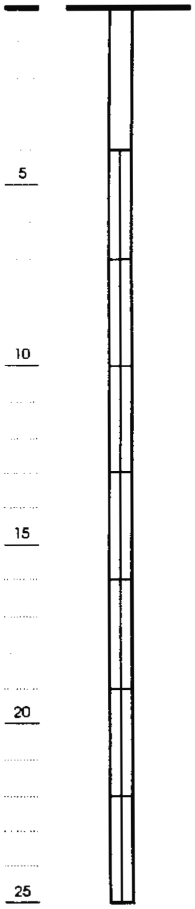
SILTY CLAY (CL), very dark gray to black, moist, medium stiff, medium plasticity.

Sandy clay interbed, with gravel.

CLAYEY SILT (ML), brown, moist, medium stiff, slight to medium plasticity.

GRAVELLY SAND (SW-GW) interbed.
SILTY CLAY (CL), brown, moist, stiff, high plasticity.

BOTTOM OF BORING AT 25 FEET.



30

35

No. 6650
Exp. 9/30/01

Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: January 19, 1999
LFR Geologist: Thomas Zakaria, R.G., CH.G.

EXPLANATION

▤ Clay

☰ Silt

▨ Sand

▩ Gravel

PID - Photoionization Detector

▼ Water level at time of drilling

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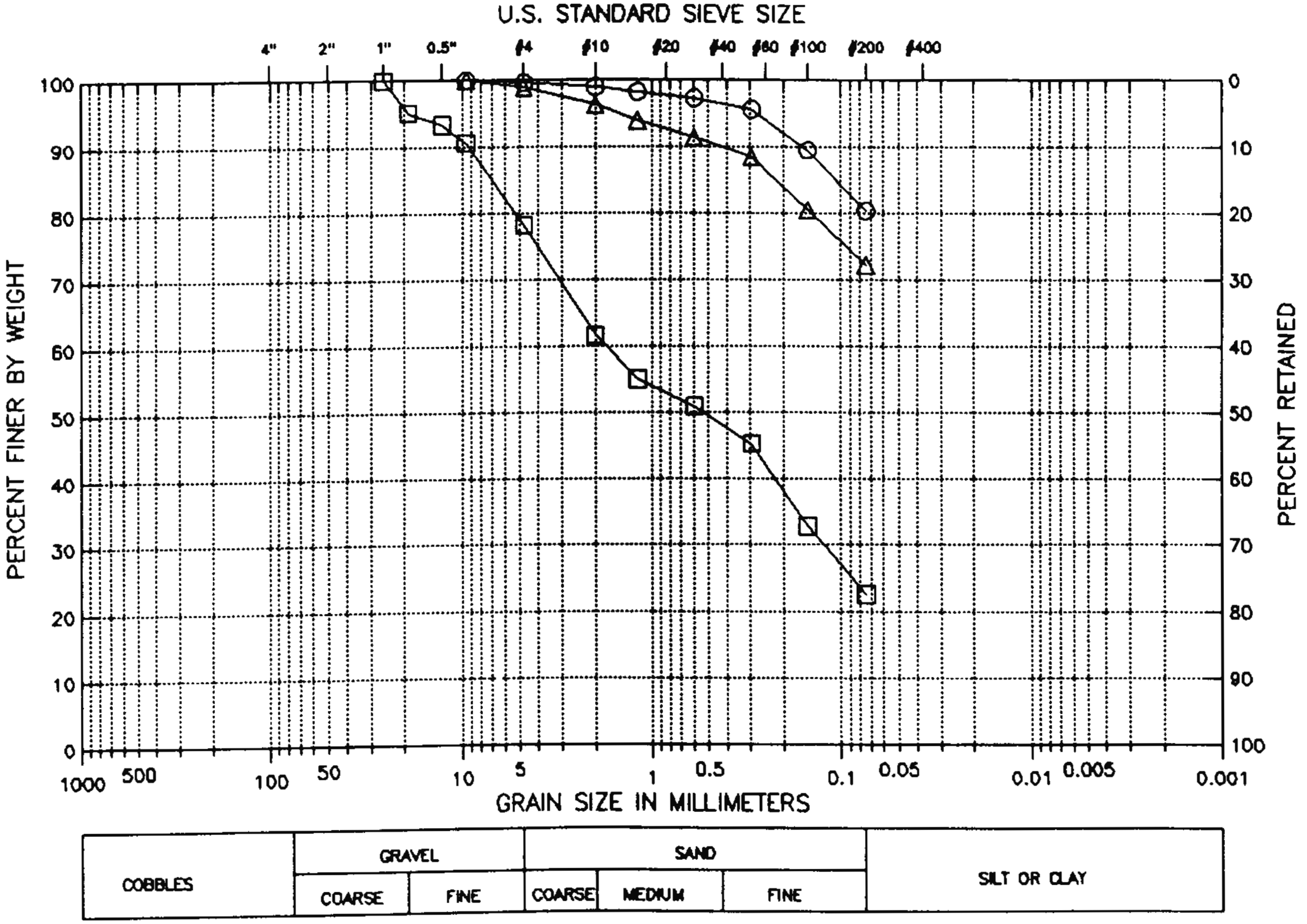
LITHOLOGY FOR 342-BH-06 *(page 1 of 1)*

Project No. 6730.00-024

Project : LEVINE FRICKE RECON 6730.00-024
Project No.: 51-0016148A.00
Location: SCVWD MTBE STUDY MORGAN HILL, CA
Date : Tue Feb 23 1999



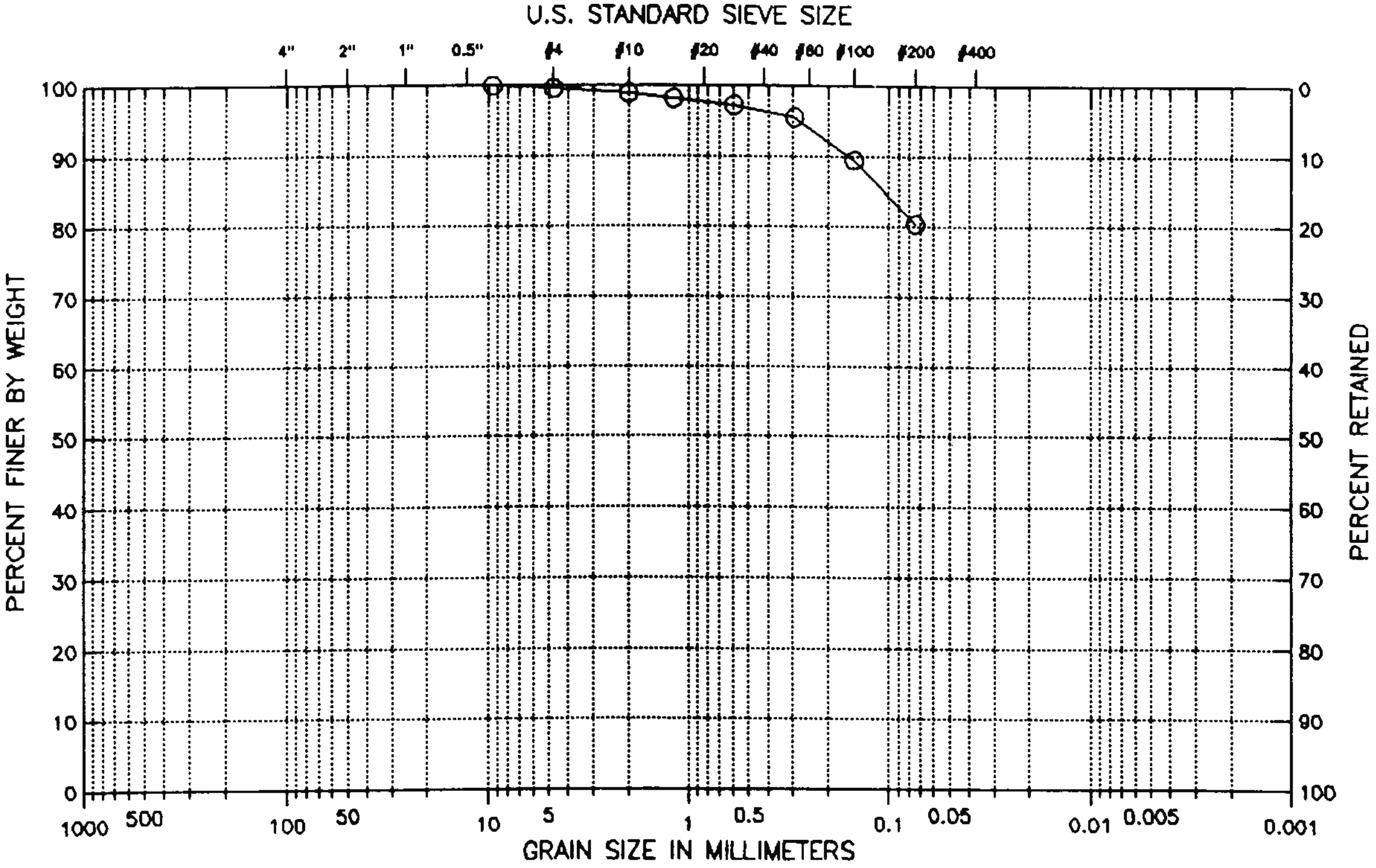
Symbol	Boring No.	Sample No.	Depth	Filename	Classification / Description
○	342-BH-02	16.0 SD	16.0 feet	342-16	BROWN FINE SANDY CLAY
△	342-BH-01	19.0 SD	19.0 feet	342-19	BROWN FINE SANDY CLAY
□	342-BH-04	25.0 SD	25.0 feet	342-25	BROWN CLAYEY SAND WITH GRAVEL

Figure 1

URS Greiner Woodward Clyde

Boring No. : 342-BH-02
Sample No.: 16.0 SD
Tested by : C. WASON
Filename : 342-16

Project : LEVINE FRICKE RECON 6730.00-024
Project No.: 51-0016148A.00
Location: SCVWD MTBE STUDY MORGAN HILL, CA
Date : Tue Feb 23 1999



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

Classification :

Visual Description :
BROWN FINE SANDY CLAY

Remarks :
Depth: 16.0 feet

Figure 1

URS Greiner Woodward Clyde

Tue Feb 23 10:06:00 1999

GEOTECHNICAL LABORATORY TEST DATA

Project : LEVINE FRICKE RECON 6730.00-024
Project No. : 51-0016148A.00
Depth : 16.0 feet
Boring No. : 342-BH-02
Test Date : 02/23/99
Sample No. : 16.0 SD
Test Method : ASTM D422
Location : SCVWD MTBE STUDY MORGAN HILL, CA
Soil Description : BROWN FINE SANDY CLAY
Remarks : Depth: 16.0 feet
Filename : 342-16
Elevation : NA
Tested by : C. WASON
Checked by : S. CAPPS

COARSE SIEVE SET

Sieve Mesh	Sieve Openings Inches	Sieve Openings Millimeters	Weight Retained (gm)	Cumulative Weight Retained (gm)	Percent Finer (%)
0.375"	0.374	9.51	0.00	0.00	100
#4	0.187	4.75	0.84	0.84	100
#10	0.079	2.00	1.48	2.32	99
#16	0.047	1.19	1.64	3.96	98
#30	0.023	0.60	2.14	6.10	97
#50	0.012	0.30	3.66	9.76	96
#100	0.006	0.15	13.63	23.39	90
#200	0.003	0.07	20.46	43.85	80

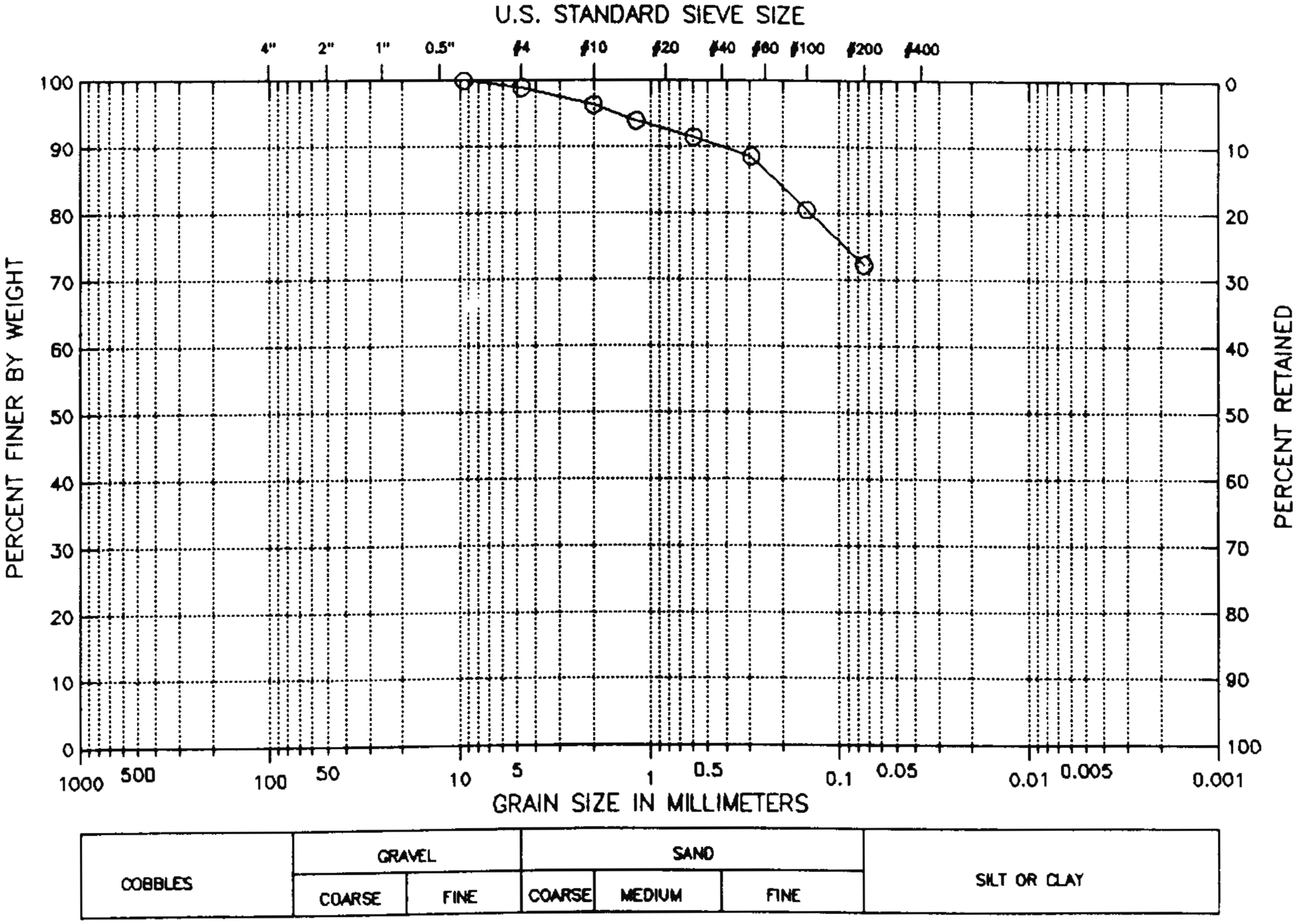
Total Dry Weight of Sample = 224.2

D85 : 0.1050 mm
D60 : N/A
D50 : N/A
D30 : N/A
D15 : N/A
D10 : N/A

Soil Classification

ASTM Group Symbol : N/A
ASTM Group Name : N/A
AASHTO Group Symbol : A-4(0)
AASHTO Group Name : Silty Soils

	Boring No. : 342-BH-01 Sample No.: 19.0 SO Tested by : C. WASON Filename : 342-19	Project : LEVINE FRICKE RECON 6730.00-024 Project No.: 51-0016148A.00 Location: SCVWD MTBE STUDY MORGAN HILL, CA Date : Tue Feb 23 1999



Classification :

Remarks :
Depth: 19.0 feet

Visual Description :
BROWN FINE SANDY CLAY

Figure 1

URS Greiner Woodward Clyde

GEOTECHNICAL LABORATORY TEST DATA

Project : LEVINE FRICKE RECON 6730.00-024		Filename : 342-19
Project No. : 51-0016148A.00	Depth : 19.0 feet	Elevation : NA
Boring No. : 342-BH-01	Test Date : 02/23/99	Tested by : C. WASON
Sample No. : 19.0 SO	Test Method : ASTM D422	Checked by : S. CAPPS

Location : SCVWD MTBE STUDY MORGAN HILL, CA
Soil Description : BROWN FINE SANDY CLAY
Remarks : Depth: 19.0 feet

COARSE SIEVE SET

Sieve Mesh	Sieve Openings Inches	Sieve Openings Millimeters	Weight Retained (gm)	Cumulative Weight Retained (gm)	Percent Finer (%)
0.375"	0.374	9.51	0.00	0.00	100
#4	0.187	4.75	1.90	1.90	99
#10	0.079	2.00	5.13	7.03	96
#16	0.047	1.19	4.44	11.47	94
#30	0.023	0.60	4.76	16.23	91
#50	0.012	0.30	5.59	21.82	89
#100	0.006	0.15	15.31	37.13	81
#200	0.003	0.07	15.80	52.93	72

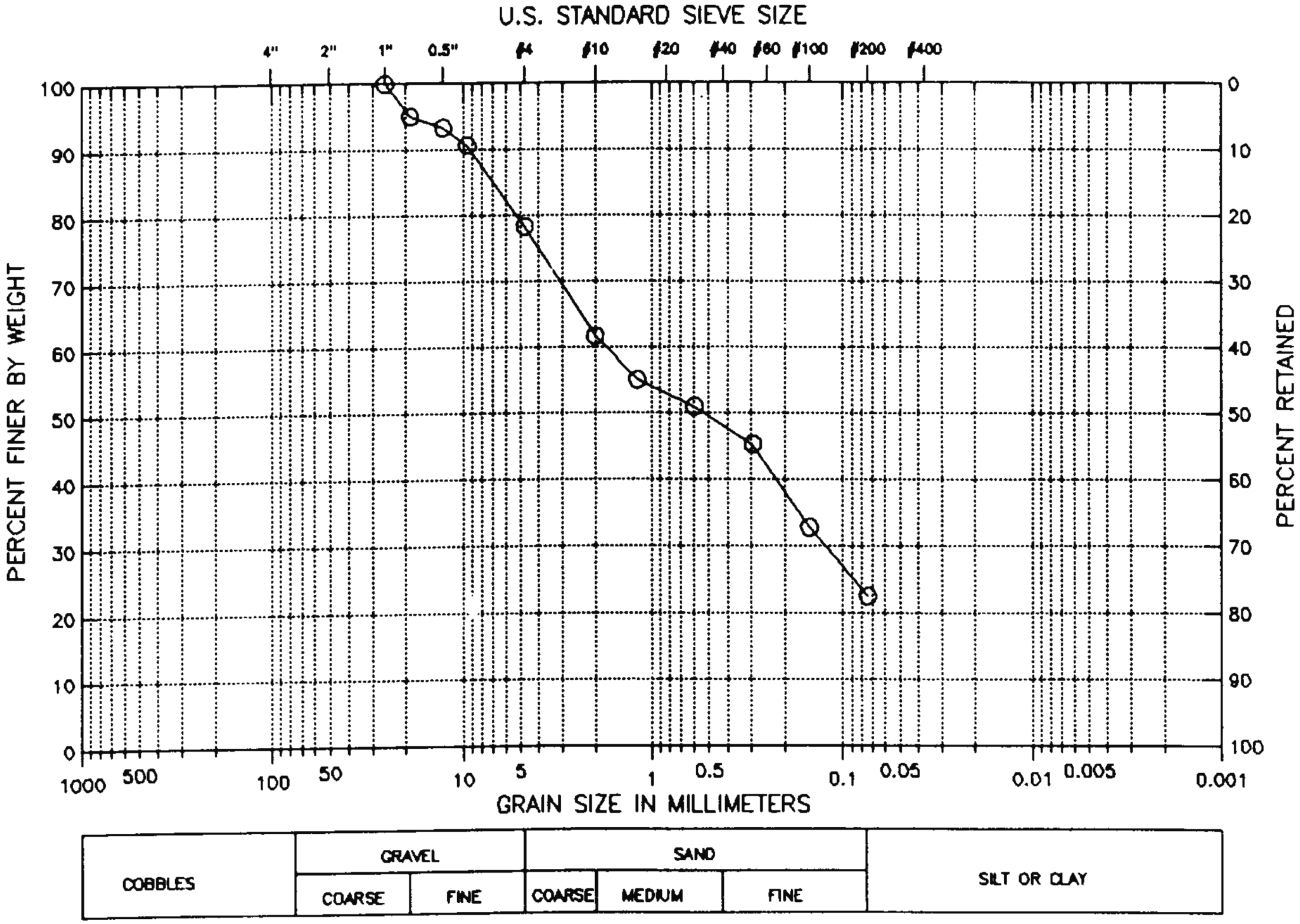
Total Dry Weight of Sample = 190.9

D85 : 0.2177 mm
D60 : N/A
D50 : N/A
D30 : N/A
D15 : N/A
D10 : N/A

Soil Classification
ASTM Group Symbol : N/A
ASTM Group Name : N/A
AASHTO Group Symbol : A-4(0)
AASHTO Group Name : Silty Soils

Boring No. : 342-BH-04
Sample No.: 25.0 SD
Tested by : C. WASON
Filename : 342-25

Project : LEVINE FRICKE RECON 6730.00-024
Project No.: 51-0016148A.00
Location: SCVWD MTBE STUDY MORGAN HILL, CA
Date : Tue Feb 23 1999



Classification :

Remarks :
Depth: 25.0 feet

Visual Description :
BROWN CLAYEY SAND WITH GRAVEL

Figure 1

URS Greiner Woodward Clyde

Tue Feb 23 10:24:12 1999

GEOTECHNICAL LABORATORY TEST DATA

Project : LEVINE FRICKE RECON 6730.00-024
Project No. : 51-0016148A.00
Boring No. : 342-BH-04
Sample No. : 25.0 SD
Depth : 25.0 feet
Test Date : 02/23/99
Test Method : ASTM D422
Filename : 342-25
Elevation : NA
Tested by : C. WASON
Checked by : S. CAPPS
Location : SCVWD MTBE STUDY MORGAN HILL, CA
Soil Description : BROWN CLAYEY SAND WITH GRAVEL
Remarks : Depth: 25.0 feet

COARSE SIEVE SET

Sieve Mesh	Sieve Openings Inches	Sieve Openings Millimeters	Weight Retained (gm)	Cumulative Weight Retained (gm)	Percent Finer (%)
1"	1.012	25.70	0.00	0.00	100
0.75"	0.748	19.00	12.82	12.82	95
0.5"	0.500	12.70	4.63	17.45	93
0.375"	0.374	9.51	6.99	24.44	91
#4	0.187	4.75	32.58	57.02	78
#10	0.079	2.00	43.88	100.90	62
#16	0.047	1.19	17.33	118.23	55
#30	0.023	0.60	10.81	129.04	51
#50	0.012	0.30	14.91	143.95	45
#100	0.006	0.15	32.95	176.90	33
#200	0.003	0.07	26.80	203.70	23

Total Dry Weight of Sample = 263.2

D85 : 6.9025 mm
D60 : 1.7540 mm
D50 : 0.5275 mm
D30 : 0.1230 mm
D15 : N/A
D10 : N/A

Soil Classification
ASTM Group Symbol : N/A
ASTM Group Name : N/A
AASHTO Group Symbol : A-1-b(0)
AASHTO Group Name : Stone Fragments, Gravel and Sand

SANTA CLARA VALLEY WATER DISTRICT
Pilot Study of Operating Underground Storage Tanks
Santa Clara County, California

Site Report

SITE NUMBER 405

Shell Oil Company
810 E Dunne Avenue
Morgan Hill, California 95037

May 4, 1999

This Site Report is one of a series of reports prepared for the Santa Clara Valley Water District's Pilot Study of Operating Underground Storage Tanks. The District funded this study to assess if MtBE is being released from UST systems that meet 1998 federal- and state-mandated upgrade requirements. The District will use the results of the Pilot Study, and possibly information obtained during subsequent investigations, to evaluate whether up-graded UST systems that handle MtBE are protective of groundwater quality, and ultimately drinking water. This Study and other District groundwater vulnerability assessments are critical in formulating a plan to protect drinking water supplies into the future.

With cooperation from the site owner and operator and the assistance of the Santa Clara County Fire Department, LFR Levine·Fricke completed a file review, site inspection, and soil-gas, soil, and groundwater sampling at this site on behalf of the District. LFR's subcontractor, Integrated Engineering Services, completed a UST inspection at this site. This report provides a brief summary of investigation findings, and site-specific data in tables, figures, and appendices. This Site Report is appended to the Summary Report for the Study.

LFR
LEVINE•FRICKE
1900 Powell Street, 12th Floor
Emeryville, California 94608-1827
(510) 652-4500/Fax (510) 652-2246

SUMMARY OF FINDINGS

SITE DESCRIPTION

Figure 1 illustrates the site location. Cone penetrometer testing data indicates site geology consists primarily of sandy silts, with some sand and clay, to a depth of approximately 70 feet below the ground surface (bgs). However, data obtained during drilling indicates primarily gravels and sands to approximately 50 feet bgs . The shallowest depth to water measured was approximately 41 feet bgs (January 1999).

SYSTEM DESCRIPTION

The UST system at the site consists of two 15,000-gallon double-walled fiberglass gasoline USTs with fiberglass reinforced plastic [FRP] exterior corrosion protection, and double-walled fiberglass piping. The UST system utilizes both electronic line leak detection and continuous interstitial monitoring for piping leak detection, and continuous interstitial monitoring for the UST leak detection.

RESULTS

MtBE was detected in soil-gas at this Site. MtBE was detected in 2 of the 8 soil-gas samples collected at concentrations of 1.1 μg/l and 8.1 μg/l. These samples were collected at different depths from the same location. Petroleum hydrocarbon constituents (benzene, toluene, ethylbenzene, and xylenes) were detected in soil-gas samples at concentrations up to 5.7 μg/l. No MtBE or petroleum hydrocarbon constituents were detected in soil or groundwater samples collected from this site.

SITE SELECTION CRITERIA MET

1998 upgrade compliant?	Yes
On SCVWD fuel leak database?	No
Status:	Not applicable
Distance from LUST site:	Less than 250 feet
Distance to water supply well:	Less than 2000 feet
Access granted?	Yes
SCVWD approved?	Yes

FILE REVIEW SUMMARY

Number of tanks:	2
Reported release?	No
Release date:	Not applicable
Fuel released:	Not applicable
Location:	Not applicable
Quantity (gallons):	Not applicable
Data available:	Not applicable
Comments:	

SITE VISIT - UST SYSTEM INFORMATION

Precision tank tightness records available?	Yes
Date of last test:	Within one year of inspection
Method of tank testing:	Vacuum/automatic tank gauging
Tank leak rate (gallons/hour):	Not noted
UST overfill prevention system present?	Yes
Type of system:	Both overfill limiter and drop tube/check-valve
Automatic shut-off?	Yes
System operational?	Yes
Overfill containment (gallons):	15
Drop tube equipped with striker plate?	Yes
Under island containment present?	Yes
Under island containment monitoring:	Liquid float
Quick release dispenser hoses?	Yes
Alarm system functional?	Yes
Type:	Shut-off
Vents:	
Vent type:	Dedicated
Vent piping:	Single walled
Condition of UST turbine sump:	Good
Condition of UST flex line sump:	Good
Vapor recovery system:	Vapor assisted
Years of operation since upgrade:	Approximately 3 years
Years of operation as fueling facility:	Approximately 3 years
Estimated throughput:	Greater than 300,000 gallons per month
Monitoring systems operational?	Not tested
Systems operations, comment:	Veederroot/simplicity
Tank annular space monitoring:	Liquid probe
Overfill containment monitoring system:	Liquid probe
Piping leak detection:	Combined (pressure line leak detection and liquid probe)
Is system monitored?	Yes
Station inventory records available?	Yes
Records up to date?	Yes
Records complete?	Yes
Supplier log reviewed?	Yes
Spill log reviewed?	No
Spill log comments:	Not maintained
Personnel training:	Yes

Comments:

Site clean with very high throughput. Throughput per Shell representative.

SITE INSPECTION

Condition of apron around pumps:	Good
Evidence of recent paving/regrading?	No
Location of recent paving/regrading:	Not applicable
Description of surface drainage?	Toward 4 onsite drains located in driveways and near southeast and nothwest corners of site.
Direct route for surface spills to subsurface?	No
Description of route to subsurface:	Not applicable
Other potential petroleum sources?	No
Description of other petroleum sources:	Not applicable
Nearby surface water?	No
Name of surface water:	Not applicable
Type of surface water:	Not applicable

Comments:

During soil gas sampling activities, field staff noted fuel in the fill and vapor return sumps after the delivery driver opened the covers to the west tank. The fuel was returned to the UST using the chain lever at the fill sump and manually, using a cup, at the vapor return sump.

UST SYSTEM DATA FROM FORM B COLLECTED DURING FILE REVIEWS - TANK ID # 5160-06 Pre

Date installed:	1995
Tank capacity (gallons):	15,000
Tank contents:	Premium unleaded
Tank construction:	
Type of system:	Double wall
Tank material (primary tank):	Fiberglass
Lining compatible with 100% methanol:	No
Exterior corrosion protection:	Fiberglass reinforced plastic
Date spill containment installed:	1995
Date overfill protection equipment installed:	1995
Drop tube:	Yes
Striker plate:	Yes
Dispenser containment:	Yes
Piping information:	
System type:	Pressure, underground
Construction:	Double wall, underground
Material and corrosion protection:	Fiberglass pipe, underground
Leak detection:	Electronic line leak test Automatic pump shut down
Tank leak detection?	Automatic tank gauging Continuous interstitial monitoring

Monthly tank testing

UST SYSTEM DATA FROM FORM B COLLECTED DURING FILE REVIEWS - TANK ID # 5160-06 Reg

Date installed:	1995
Tank capacity (gallons):	15,000
Tank contents:	Regular unleaded
Tank construction:	
Type of system:	Double wall
Tank material (primary tank):	Fiberglass
Lining compatible with 100% methanol:	No
Exterior corrosion protection:	Fiberglass reinforced plastic
Date spill containment installed:	Not noted
Date overfill protection equipment installed:	Not noted
Drop tube:	Yes
Striker plate:	Yes
Dispenser containment:	Yes
Piping Information:	
System type:	Pressure, underground
Construction:	Double wall, underground
Material and corrosion protection:	Fiberglass pipe, underground
Leak detection:	Continuous interstitial monitoring Electronic line leak test Automatic pump shut down
Tank leak detection?	Automatic tank gauging Continuous interstitial monitoring Monthly tank testing

Table 1
Summary of Chemical Analysis Results for Soil-Gas Samples - Site #405
Santa Clara Valley Water District

Location	Date Sampled	Depth (ft bgs)	Methyl Tertiary Butyl Ether (MTBE) ug/L	TPH as Gasoline (TPHg) ug/L	Benzene (B) ug/L	Toluene (T) ug/L	Ethyl Benzene (E) ug/L	meta/para-Xylenes (m/p-X) ug/L	ortho-Xylene (o-X) ug/L	Notes
405-SG-01	01/08/99	10	<5	<100	<1	3.8	4.6	<1	<1	
405-SG-02	01/11/99	10	<5	<100	<1	1.3	<1	3.6	<1	
		20	8.1	690	<1	2.9	5.7	<1	3.8	
405-SG-02-SPL		20	1.1	NA	0.22	1.0	0.11 J	0.39	0.12 J	(a)
405-SG-03	01/11/99	10	<5	<100	<1	<1	4.9	<1	<1	
405-SG-03-DUP		10	<5	<100	<1	<1	2.7	<1	<1	
405-SG-03		20	<5	<100	<1	1	1.9	<1	<1	
405-SG-04	01/11/99	10	<5	<100	<1	<1	<1	1.6	1.3	
405-SG-05	01/11/99	10	<5	<100	<1	<1	<1	1	<1	
		20	<5	<100	<1	1.0	<1	1.7	<1	

Table proofed by CLC.

Notes:

(a) Other analytes detected: Ethanol (0.12 ug/L)

All primary and field duplicate (-DUP) samples were analyzed on site by InterPhase, of Los Angeles, CA using EPA Method 8020 for MTBE and BTEX, and Modified EPA Method 8015 for TPHg.

Additional field duplicate samples (-SPL) were analyzed off site by Air Toxics, Ltd., Folsom, CA using EPA Method TO-14.

ft bgs = feet below ground surface
NA = Not analyzed
TPH = total petroleum hydrocarbons
ug/L = micrograms per liter

Data Qualifiers (if shown on table):

E = Exceeds the calibration range
I = Interference by the sample matrix
J = Estimated value
UJ = Not detected at the estimated reporting limit shown

Table 2
Summary of Chemical Analysis Results for Soil Samples - Site #405
Santa Clara Valley Water District

Location	Date Sampled	Depth (ft bgs)	Methyl Tertiary Butyl Ether (MTBE) ug/Kg	TPH as Gasoline (TPHg) mg/Kg	Benzene (B) ug/Kg	Toluene (T) ug/Kg	Ethyl Benzene (E) ug/Kg	meta/para-Xylenes (m/p-X) ug/Kg	ortho-Xylene (o-X) ug/Kg	Di-isopropyl Ether (DIPE) ug/Kg	Ethyl Tertiary Butyl Ether (ETBE) ug/Kg	Tertiary Amyl Methyl Ether (TAME) ug/Kg	Tertiary Butyl Alcohol (TBA) ug/Kg
405-BH-01	01/28/99	8.0-8.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		13.5-14.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		18.0-18.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
405-BH-02	01/28/99	13.5-14.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		20.5-21.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		39.0-39.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
405-BH-03	01/29/99	11.0-11.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		20.5-21.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		35.5-36.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
405-BH-04	01/29/99	10.5-11.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		20.5-21.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		25.5-26.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200

Table proofed by CLC.

Notes:

All samples were analyzed by Alpha Analytical, Inc. of Sparks, NV, using EPA Method 8260 for MTBE, BTEX, DIPE, ETBE, TAME, and TBA, and Modified EPA Method 8015 for TPHg.

ft bgs = feet below ground surface

mg/Kg = milligrams per kilogram

TPH = total petroleum hydrocarbons

ug/Kg = micrograms per kilogram

Data Qualifiers (if shown on table):

J = Estimated value

UJ =Not detected at the estimated reporting limit shown

Table 3
Summary of Chemical Analysis Results for Groundwater Samples - Site # 405
Santa Clara Valley Water District

Location	Date Sampled	Depth (ft bgs)	Methyl Tertiary Butyl Ether (MTBE) ug/L	TPH as Gasoline (TPHg) mg/L	Benzene (B) ug/L	Toluene (T) ug/L	Ethyl Benzene (E) ug/L	meta/para-Xylenes (m/p-X) ug/L	ortho-Xylene (o-X) ug/L	Di-isopropyl Ether (DIPE) ug/L	Ethyl Tertiary Butyl Ether (ETBE) ug/L	Tertiary Amyl Methyl Ether (TAME) ug/L	Tertiary Butyl Alcohol (TBA) ug/L
405-BH-01	01/28/99	33.5-43.5	<0.5	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<10
405-BH-02	01/28/99	47.0-52.0	<0.5	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<10
405-BH-02-DUP		47.0-52.0	<0.5	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<10
405-BH-03	01/29/99	50.0-55.0	<0.5	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<10
405-BH-04	01/29/99	50.0-55.0	<0.5	<0.05	<0.5	0.63	<0.5	<0.5	<0.5	<1	<1	<1	<10

Table proofed by CLC.

Notes:

All primary and field duplicate (-DUP) samples were analyzed by Alpha Analytical, Inc. of Sparks, NV, using EPA Method 8260 for MTBE, BTEX, DIPE, ETBE, TAME, and TBA, and Modified EPA Method 8015 for TPHg.

ft bgs = feet below ground surface
mg/L = milligrams per liter
TPH = total petroleum hydrocarbons
ug/L = micrograms per liter

Data Qualifiers (if shown on table):

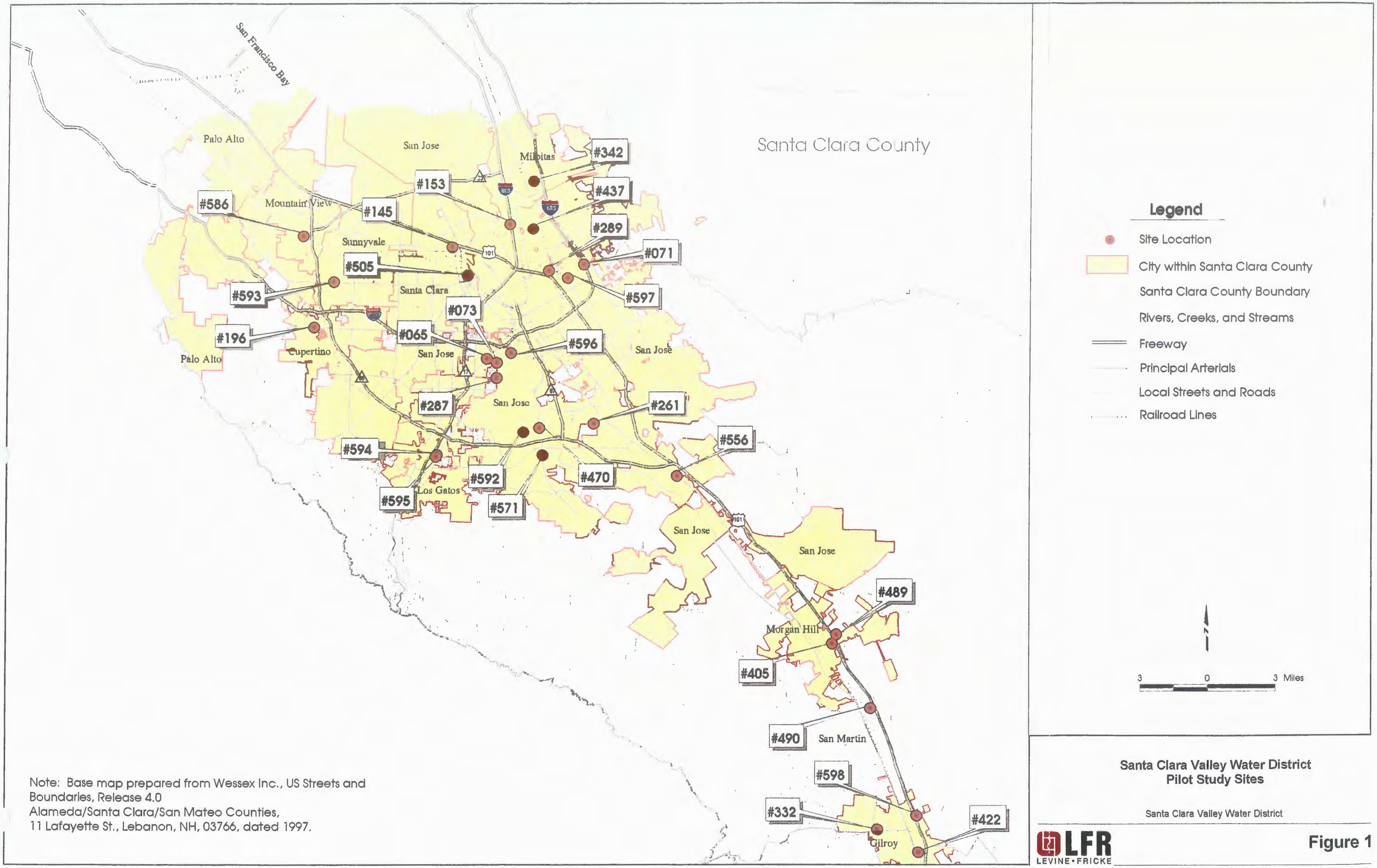
J = Estimated value
UJ =Not detected at the estimated reporting limit shown

Table 4
Summary of Physical Parameters for Soil Samples - Site #405
Santa Clara Valley Water District

Location	Depth (ft bgs)	Visual Description	Total Organic Carbon (percent)	Moisture Content (percent)	Wet Weight (lbs/cu.ft.)	Dry Unit Weight (lbs/cu.ft.)	Porosity (percent)
405-BH-01	11.5 - 12.0	Brown gravelly silty sand with gravel (SM)	0.02	5.98	132.8	125.3	25.61
405-BH-02	21.0 - 21.5	Brown/dk. brown sandy gravel (GM)	0.02	10.95	145.3	130.9	22.29

Table proofed by CLC.

Notes:
Specific gravity values were 2.70 for all samples analyzed.
Total organic carbon analyses were performed by Curtis and Tompkins Analytical Laboratories, Berkeley, CA.
All other analyses were performed by URS Greiner Woodward Clyde, Oakland, CA.
ft bgs = feet below ground surface
lbs/cu.ft. = pounds per cubic foot
NA = Not analyzed



Note: Base map prepared from Wessex Inc., US Streets and Boundaries, Release 4.0
Alameda/Santa Clara/San Mateo Counties,
11 Lafayette St., Lebanon, NH, 03766, dated 1997.

Santa Clara Valley Water District
Pilot Study Sites

Santa Clara Valley Water District

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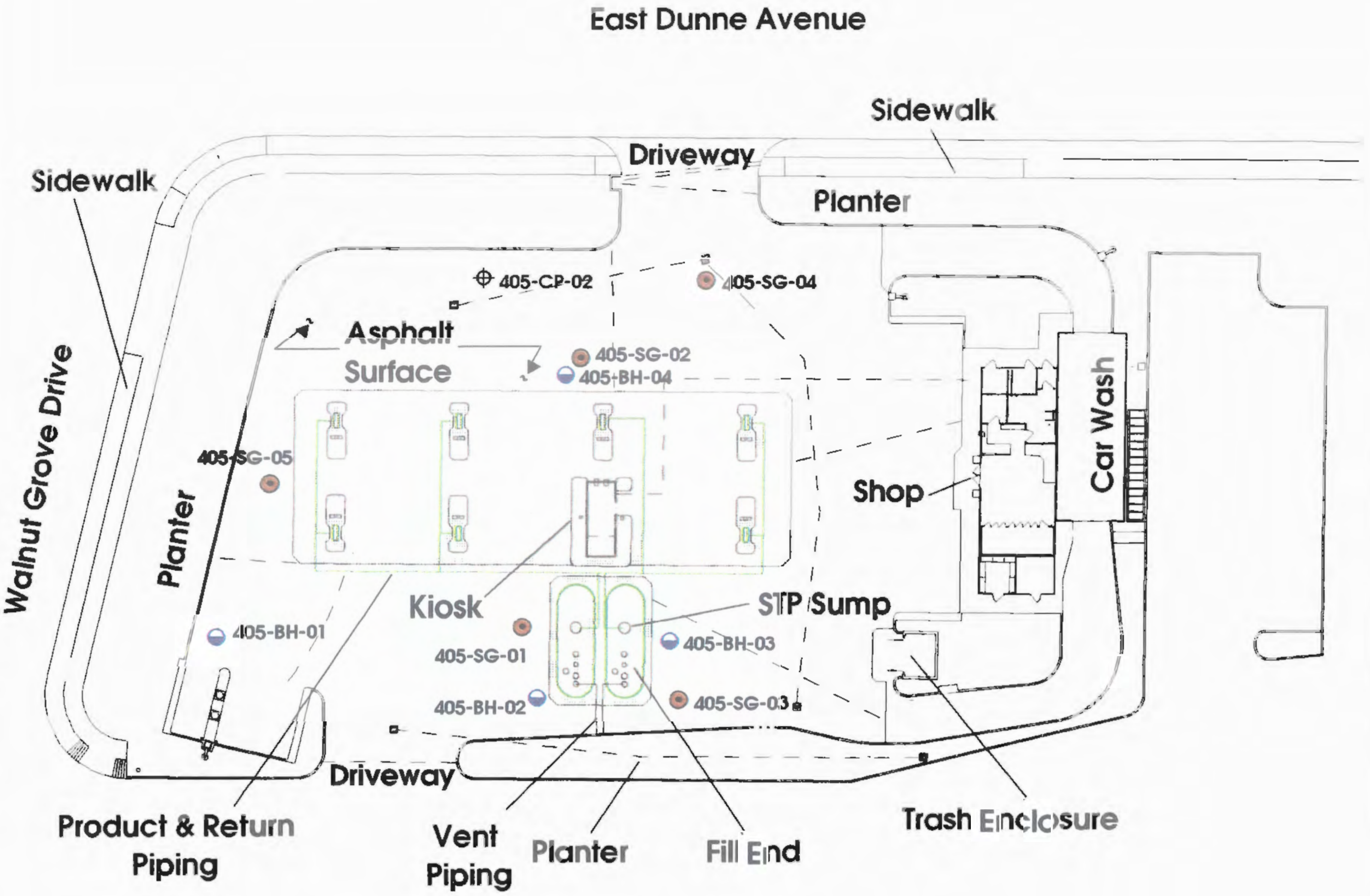
Figure 1



Legend

🟩 Gasoline underground storage tank, product and return piping, and dispenser

○ UST access port

☐ Concrete slab

▤ Storm Drain Catch Basin

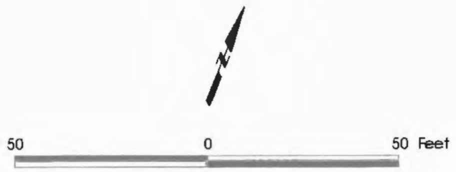
— — — Underground utilities

◒ Soil and groundwater sampling location

● Soil-gas sampling location

⊕ Cone-penetrometer test location

STP - Submersible Turbine Pump



Note: Base map prepared from Site Plan, 800 East Dunne Ave., Morgan Hill, CA, 95037, Page # 1 Shell Oil Products Company, prepared by RHL Design Group Inc., dated 1/9/98.

Site #405

Site Plan

Santa Clara Valley Water District

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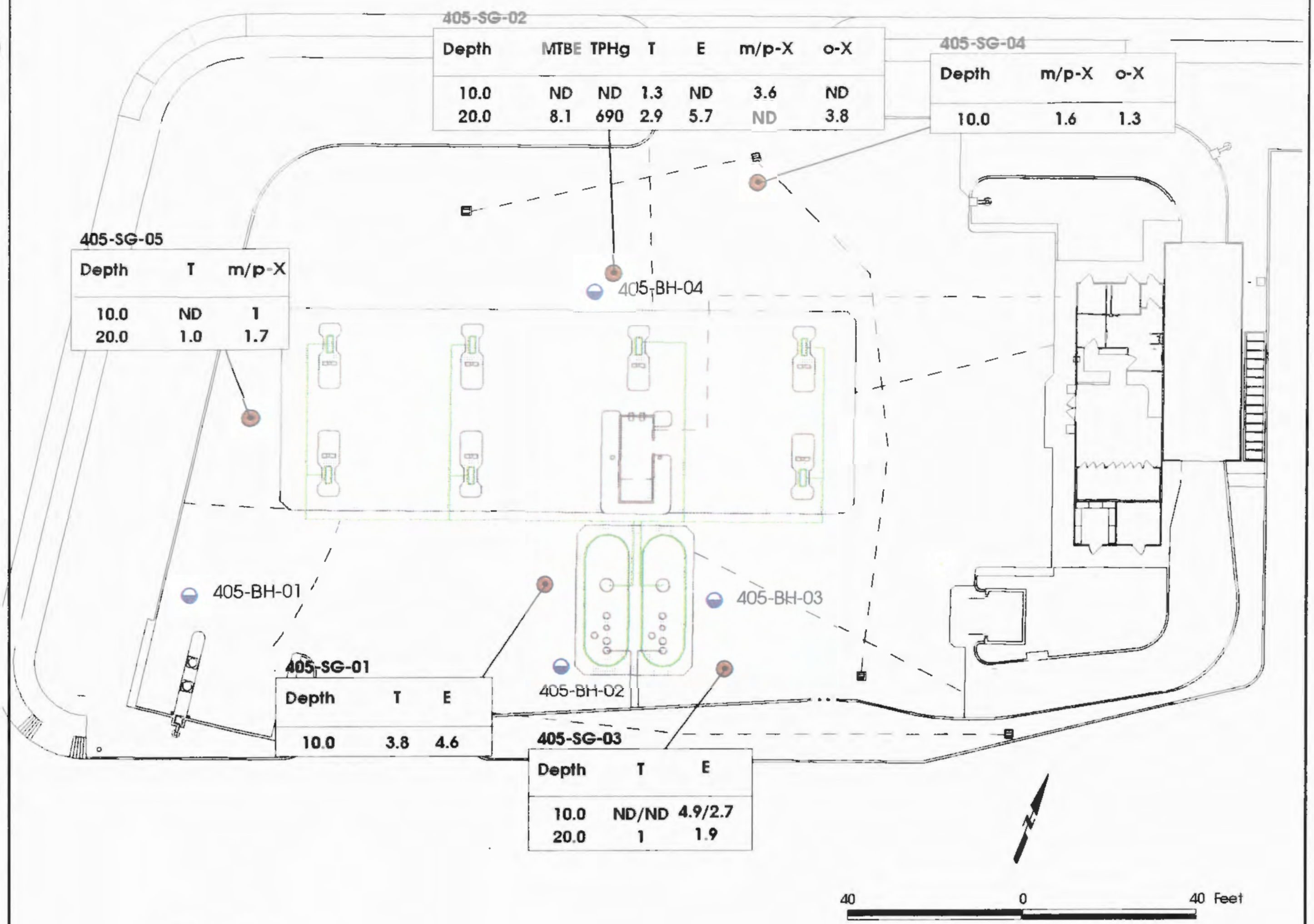
Figure 2



405-SG-02

Depth	MTBE	TPHg	T	E	m/p-X	o-X
10.0	ND	ND	1.3	ND	3.6	ND
20.0	8.1	690	2.9	5.7	ND	3.8

405-SG-04

Depth	m/p-X	o-X
10.0	1.6	1.3

405-SG-05

Depth	T	m/p-X
10.0	ND	1
20.0	1.0	1.7

405-SG-01

Depth	T	E
10.0	3.8	4.6

405-SG-03

Depth	T	E
10.0	ND/ND	4.9/2.7
20.0	1	1.9

Legend

● Soil-gas sampling location

◓ Soil and groundwater sampling location

The following represents a hypothetical sampling point and defines the characters associated with that point:

Sample Location — ###-SG-01

Depth	m/p-X	T
5.0	2.5	4.1
12.0	1.0/1.2	ND/ND

Depth in feet

Result of primary analysis

Result of duplicate analysis when applicable

🟩 Gasoline underground storage tank, product and return piping, and dispenser

○ UST access port

☐ Concrete slab

▤ Storm Drain

— — — Underground utilities

See Figure 2 for description of site features and origin of base map.

Notes

Concentrations of analytes detected are presented; analytes not detected are not presented or are presented as ND (not detected). MTBE and BTEX were analyzed using EPA Method 8020 and TPHg was analyzed suing Modified EPA Method 8015.

Results in micrograms/liter (ug/L)
RL = Reporting Limit

Each sample was analyzed for the following:

MTBE = Methyl Tertiary Butyl Ether (RL = 5 ug/L)
TPHg = Total Petroleum Hydrocarbons as Gasoline (RL = 100 ug/L)
B = Benzene (RL = 1 ug/L)
T = Toluene (RL = 1 ug/L)
E = Ethyl Benzene (RL = 1 ug/L)
m/p-X = meta/para-Xylenes (RL = 1 ug/L)
o-X = ortho-Xylene (RL = 1 ug/L)

Site #405

Summary of Chemical Analysis Results for Soil-Gas Samples

Santa Clara Valley Water District

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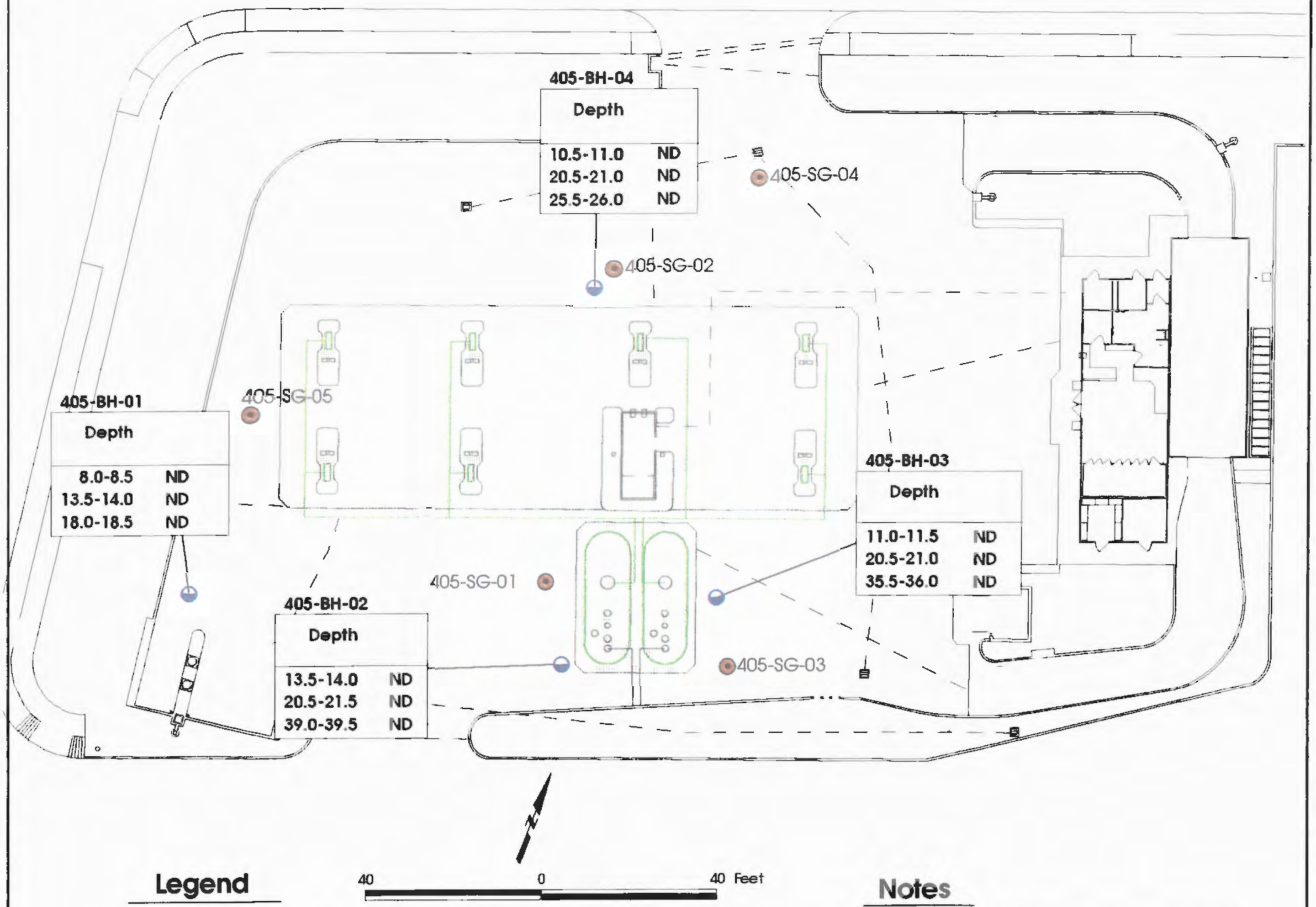
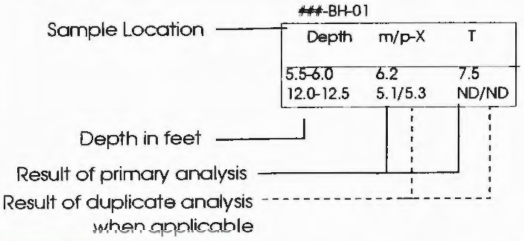
Figure 3



Legend

- ◒ Soil and groundwater sampling location
- ◉ Soil-gas sampling location

The following represents a hypothetical sampling point and defines the characters associated with that point:



- 🟩 Gasoline underground storage tank, product and return piping, and dispenser
- ○ UST access port
- ☐ Concrete slab
- ▤ Storm Drain
- – – – Underground utilities

See Figure 2 for description of site features and origin of base map.

Notes

Concentrations of analytes detected are presented; analytes not detected are not presented or are presented as ND (not detected). TPHg was analyzed using Modified EPA Method 8015, all other analytes were analyzed using EPA Method 8260.

Results in micrograms/kilogram (ug/Kg) for all compounds except TPHg which is presented in milligrams/kilogram (mg/Kg).

RL = Reporting Limit

Each sample was analyzed for the following:

MTBE = Methyl Tertiary Butyl Ether (RL = 5 ug/Kg)
TPHg = Total Petroleum Hydrocarbons as Gasoline (RL = 1 mg/Kg)
B = Benzene (RL = 5 ug/Kg)
T = Toluene (RL = 5 ug/Kg)
E = Ethyl Benzene (RL = 5 ug/Kg)
m/p-X = meta/para-Xylenes (RL = 5 ug/Kg)
o-X = ortho-Xylene (RL = 5 ug/Kg)
DIPE = Di-isopropyl Ether (RL = 20 ug/Kg)
ETBE = Ethyl Tertiary Butyl Ether (RL = 20 ug/Kg)
TAME = Tertiary Amyl Methyl Ether (RL = 20 ug/Kg)
TBA = Tertiary Butyl Alcohol (RL = 200 ug/Kg)

Site #405

Summary of Chemical Analysis Results for Soil Samples

Santa Clara Valley Water District

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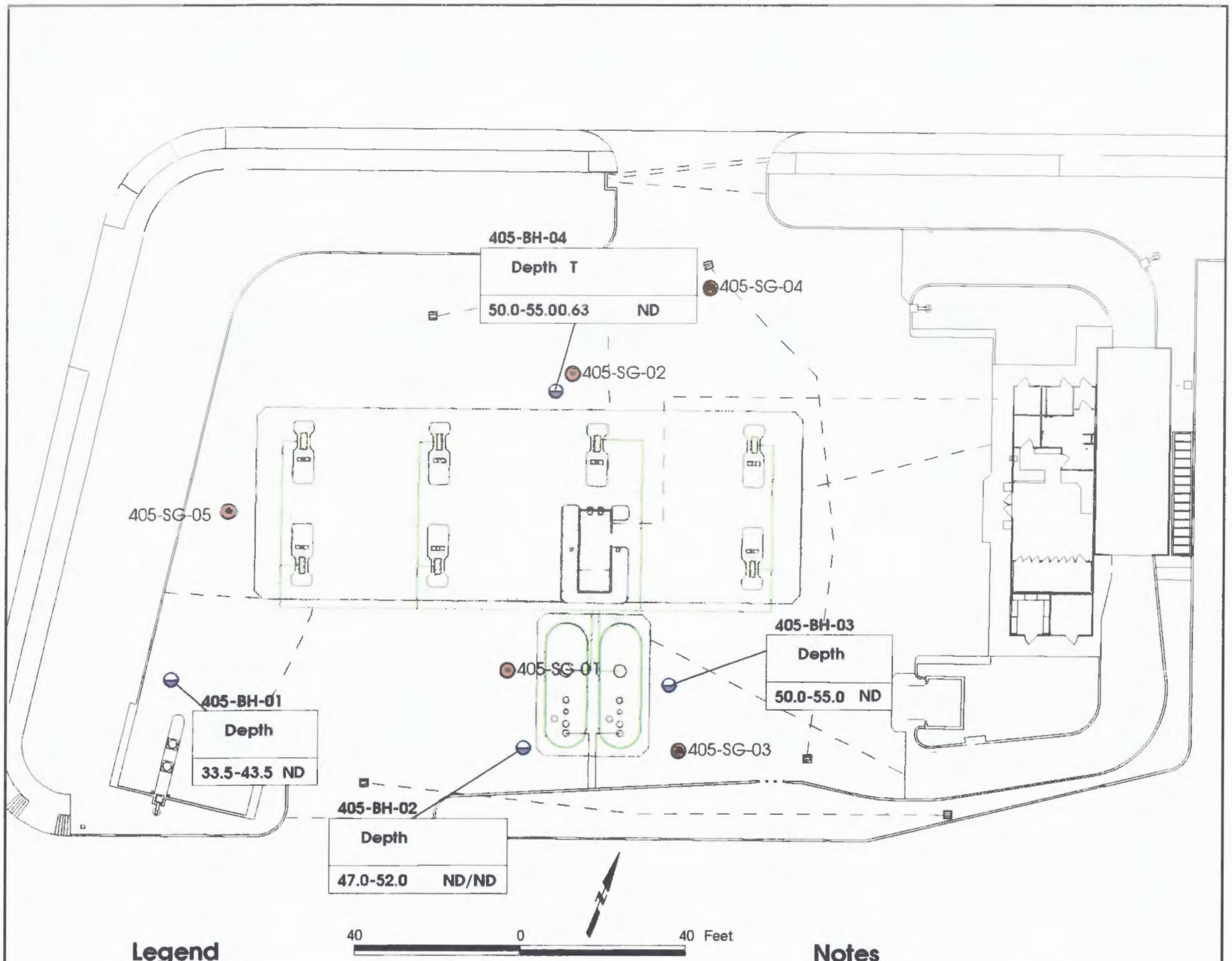
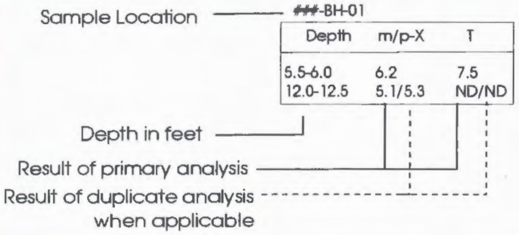
Figure 4



Legend

- ⊖ Soil and groundwater sampling location
- ◉ Soil-gas sampling location

The following represents a hypothetical sampling point and defines the characters associated with that point:



- ▭ Gasoline underground storage tank, product and return piping, and dispenser
- ○ UST access port
- ▭ Concrete slab
- ▤ Storm Drain
- — — — Underground utilities

See Figure 2 for description of site features and origin of base map.

Notes

Concentrations of analytes detected are presented; analytes not detected are not presented or are presented as ND (not detected). TPHg was analyzed using Modified EPA Method 8015, all other analytes were analyzed using EPA Method 8260.

Results in micrograms/liter (ug/L) for all compounds except TPHg which is presented in milligrams/liter (mg/L).

RL = Reporting Limit

Each sample was analyzed for the following:

MTBE = Methyl Tertiary Butyl Ether (RL = 0.5 ug/L)
TPHg = Total Petroleum Hydrocarbons as Gasoline (RL = 0.05 mg/L)
B = Benzene (RL = 0.5 ug/L)
T = Toluene (RL = 1 ug/L)
E = Ethyl Benzene (RL = 0.5 ug/L)
m/p-X = meta/para-Xylenes (RL = 0.5 ug/L)
o-X = ortho-Xylene (RL = 0.5 ug/L)
DIPE = Di-isopropyl Ether (RL = 1 ug/L)
ETBE = Ethyl Tertiary Butyl Ether (RL = 1 ug/L)
TAME = Tertiary Amyl Methyl Ether (RL = 1 ug/L)
TBA = Tertiary Butyl Alcohol (RL = 10 ug/L)

Site #405

Summary of Chemical Analysis Results for Groundwater Samples

Santa Clara Valley Water District

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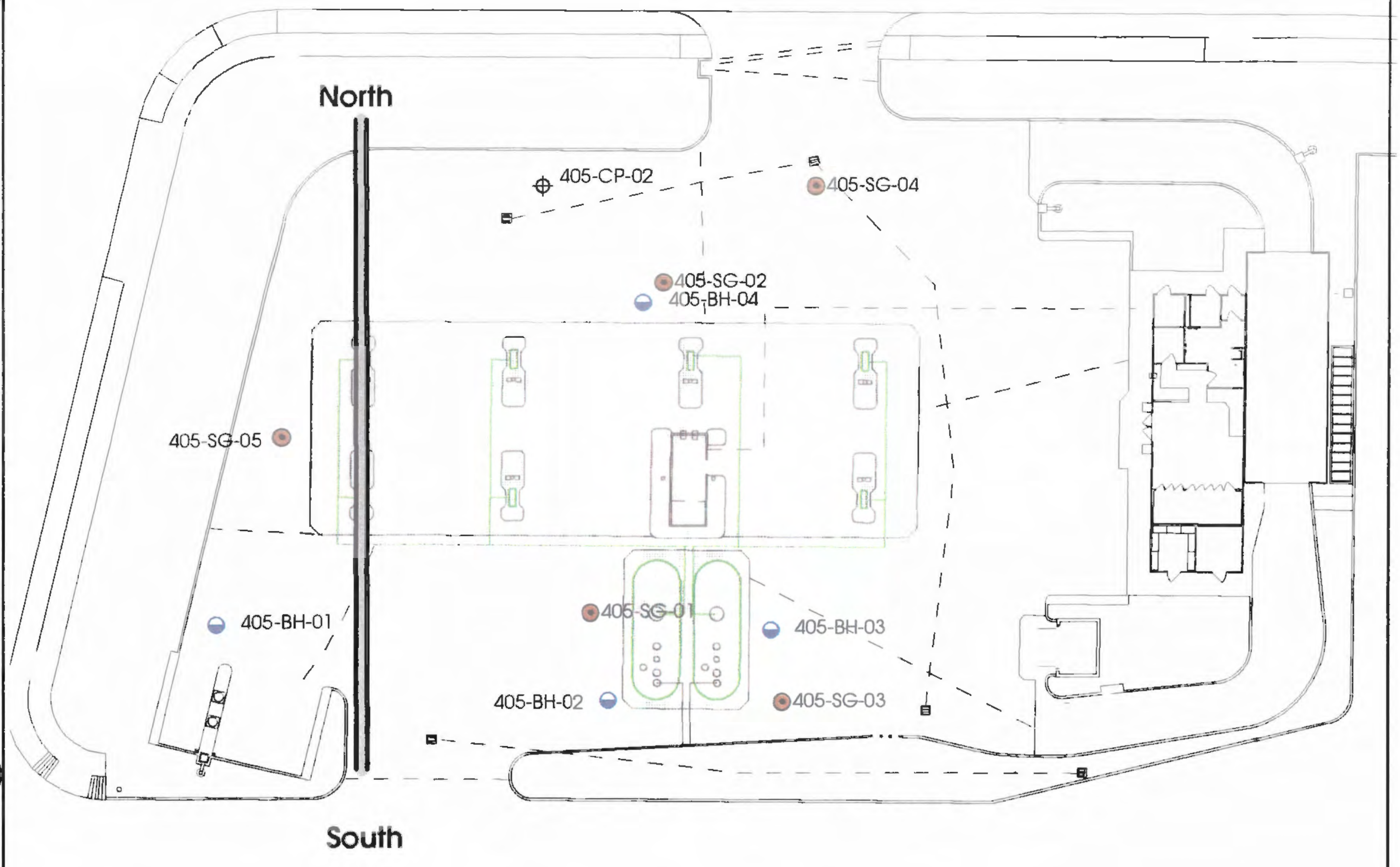
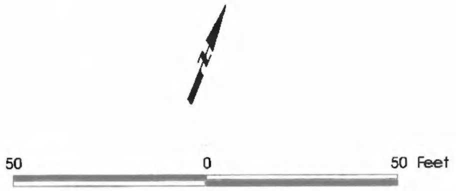
Figure 5





Legend

🟩 Gasoline underground storage tank, product and return piping, and dispenser

○ UST access port

▭ Concrete slab

▤ Storm Drain Catch Basin

– – – Underground utilities

◒ Soil and groundwater sampling location

● Soil-gas sampling location

⊕ Cone-penetrometer test location

See Figure 2 for description of site features and origin of base map.

u:/scwd/gis/405.apr

Site #405

Site Plan Showing Orientation of Vertical Profile

Santa Clara Valley Water District

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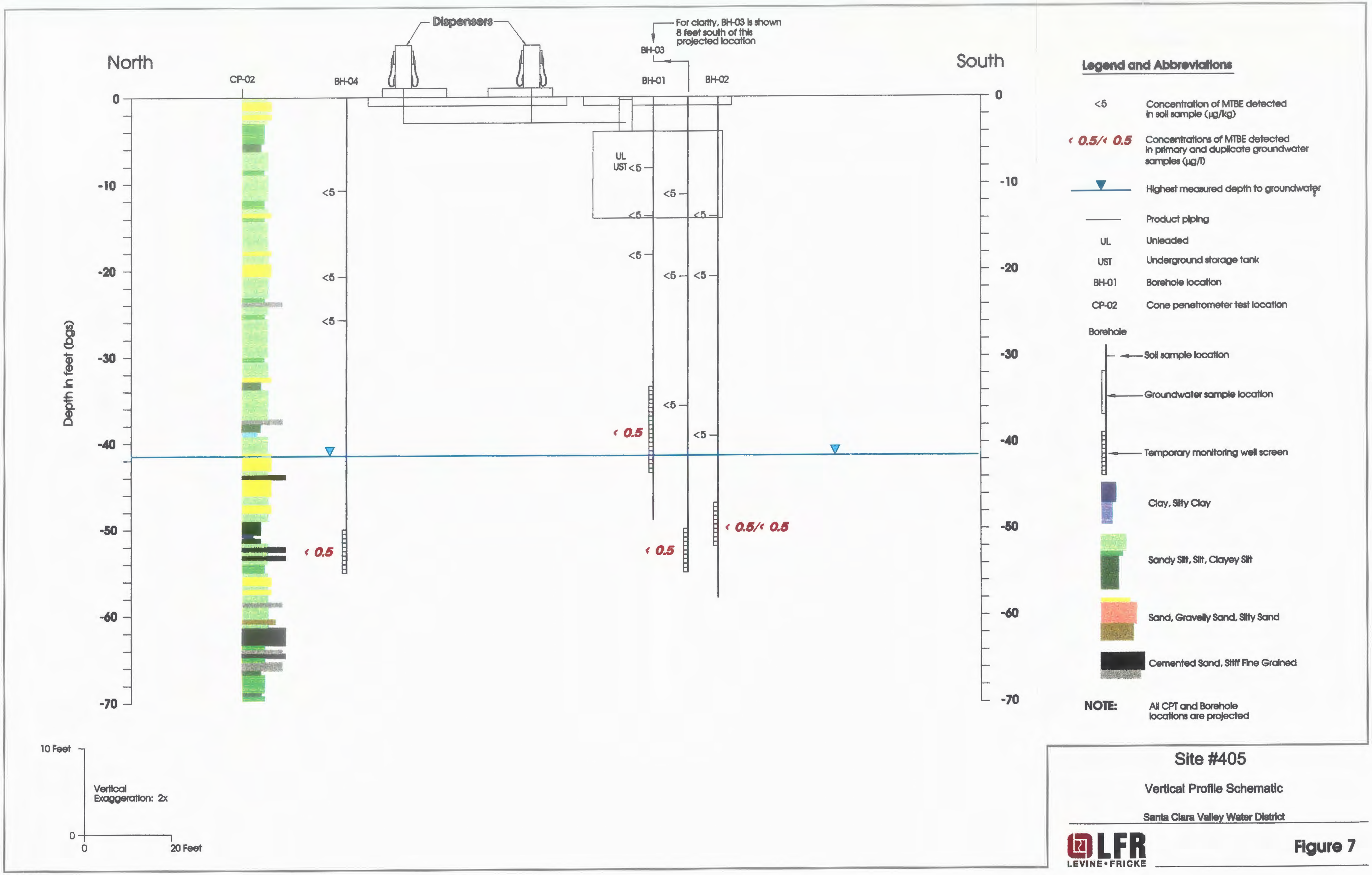
Figure 6


Dispensers
For clarity, BH-03 is shown 8 feet south of this projected location
BH-03
North
South
CP-02
BH-04
BH-01
BH-02
0
-10
-20
-30
-40
-50
-60
-70
Depth in feet (bgs)
UL
UST
<5
‹ 0.5
‹ 0.5/‹ 0.5
10 Feet
0
20 Feet
Vertical Exaggeration: 2x
Legend and Abbreviations
<5 Concentration of MTBE detected in soil sample (µg/kg)
‹ 0.5/‹ 0.5 Concentrations of MTBE detected in primary and duplicate groundwater samples (µg/l)
Highest measured depth to groundwater
Product piping
UL Unleaded
UST Underground storage tank
BH-01 Borehole location
CP-02 Cone penetrometer test location
Borehole
Soil sample location
Groundwater sample location
Temporary monitoring well screen
Clay, Silty Clay
Sandy Silt, Silt, Clayey Silt
Sand, Gravelly Sand, Silty Sand
Cemented Sand, Stiff Fine Grained
NOTE: All CPT and Borehole locations are projected

Site #405

Vertical Profile Schematic

Santa Clara Valley Water District

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Figure 7

J:\ENGCAD\6730\CM#505.DWG 04/21/99 CM#405.PCP

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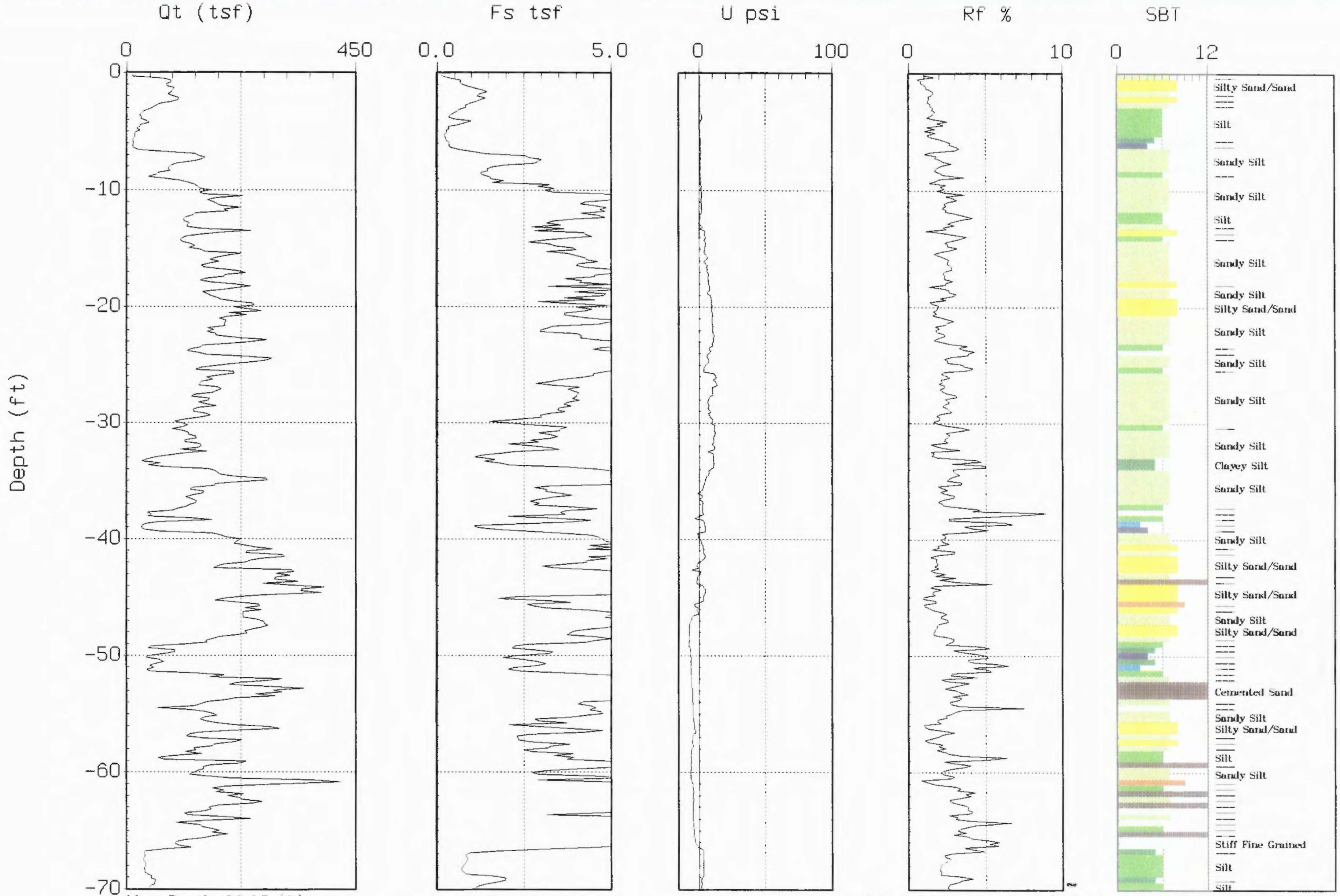
Site: 405 SHELL OIL
Location : 405-CP-02

Geologist: T. BENNETT
Date : 12:30:98 18:39



Max. Depth: 80.05 (ft)

Depth Inc.: 0.164 (ft)

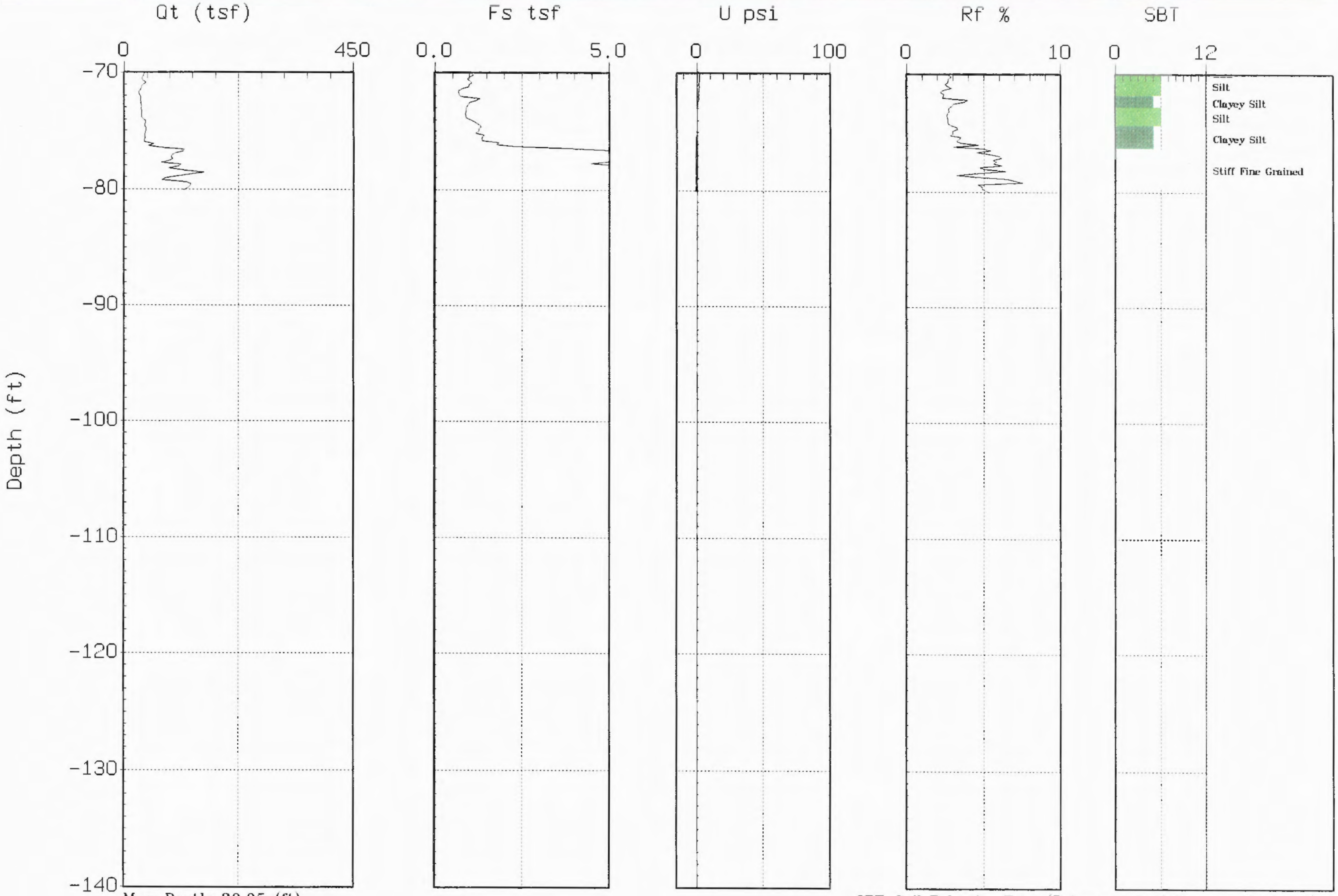
SBT: Soil Behavior Type (Robertson and Campanella 1988)

GREGG

LFR LEVINE.FRICKE

Site: 405 SHELL OIL
Location : 405-CP-02

Geologist: T. BENNETT
Date : 12:30:98 18:39



Max. Depth: 80.05 (ft)

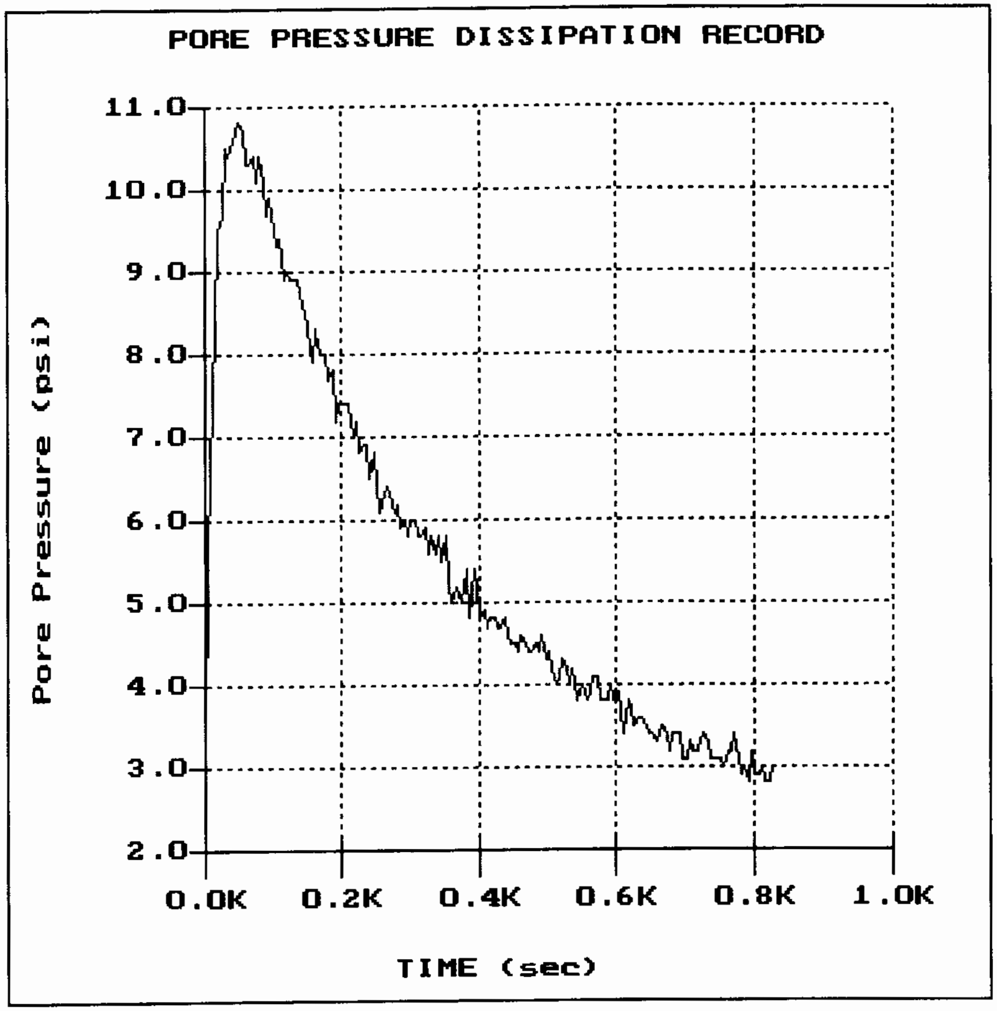
Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson and Campanella 1988)

LFR LEVINE FRICKE

Hole:405-CP-02
Location:405 SHELL OIL

Cone:20 TON AD071
Date:12:30:98 18:39


PORE PRESSURE DISSIPATION RECORD

File: 14540502.PPR
Depth (m): 10.85
(ft): 35.60
Duration : 825.0s
U-min: 2.80 820.0s
U-max: 10.80 50.0s

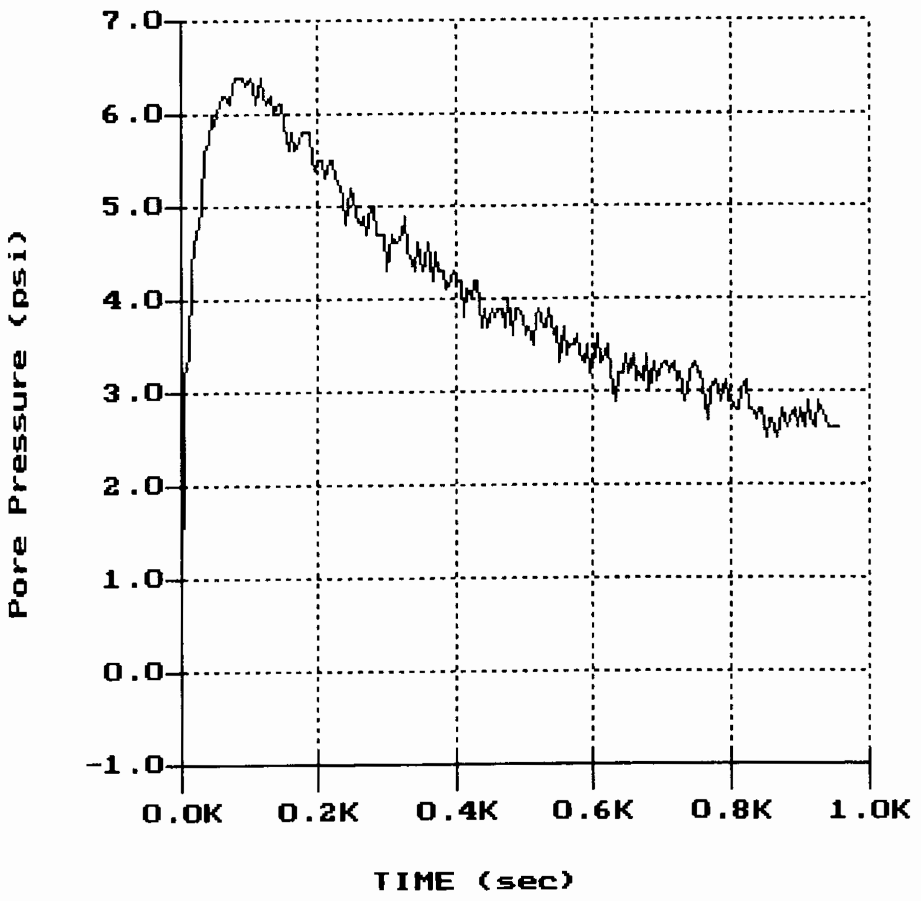
LFR LEVINE FRICKE

Hole:405-CP-02
Location:405 SHELL OIL

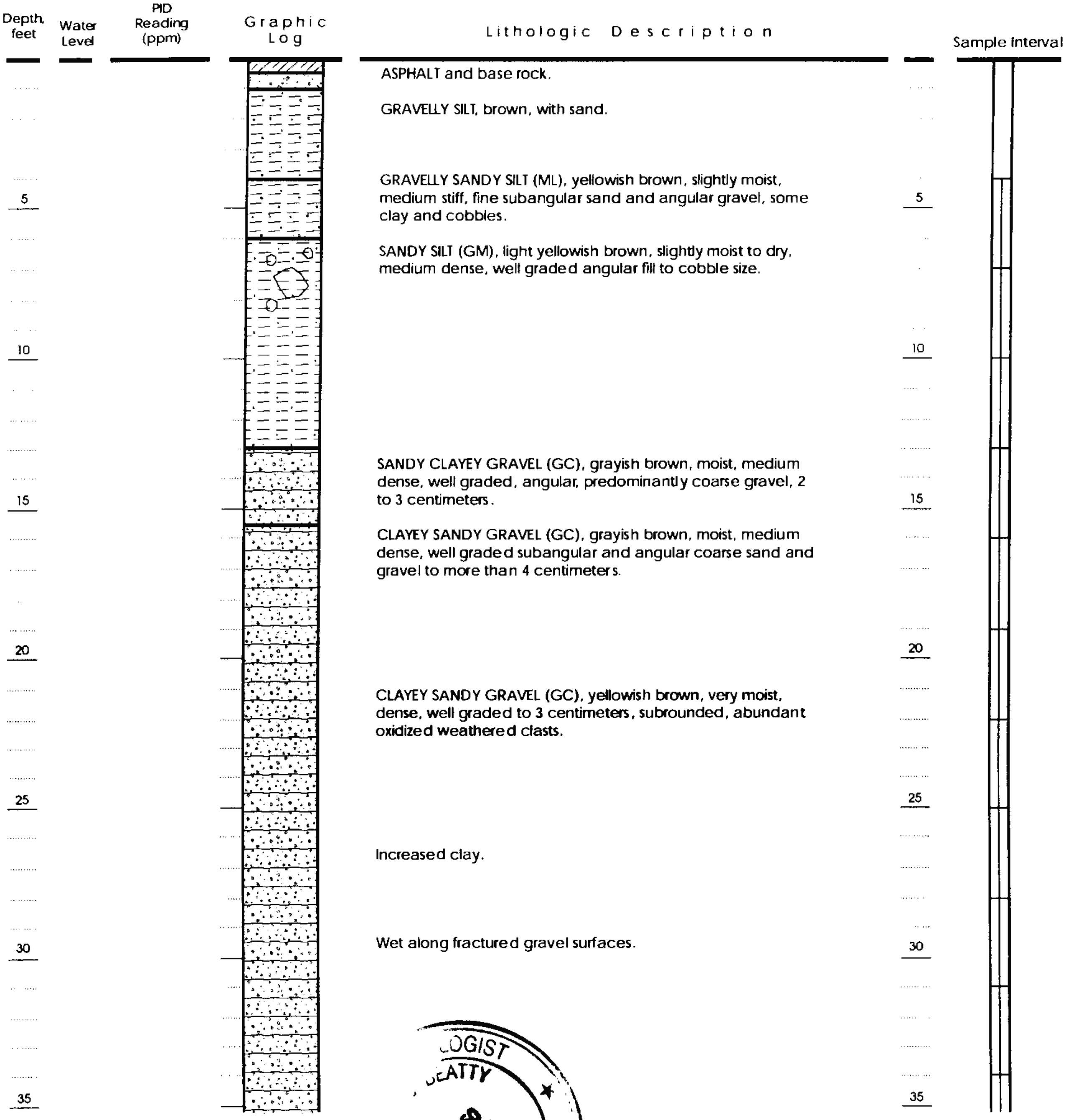
Cone:20 TON AD071
Date:12:30:98 18:39

File: 14540502.PPR
Depth (m): 12.95
(ft): 42.49
Duration : 955.0s
U-min: -0.10 0.0s
U-max: 6.40 115.0s

PORE PRESSURE DISSIPATION RECORD



SCVWD PILOT STUDY



ASPHALT and base rock.

GRAVELLY SILT, brown, with sand.

GRAVELLY SANDY SILT (ML), yellowish brown, slightly moist, medium stiff, fine subangular sand and angular gravel, some clay and cobbles.

SANDY SILT (GM), light yellowish brown, slightly moist to dry, medium dense, well graded angular fill to cobble size.

SANDY CLAYEY GRAVEL (GC), grayish brown, moist, medium dense, well graded, angular, predominantly coarse gravel, 2 to 3 centimeters.

CLAYEY SANDY GRAVEL (GC), grayish brown, moist, medium dense, well graded subangular and angular coarse sand and gravel to more than 4 centimeters.

CLAYEY SANDY GRAVEL (GC), yellowish brown, very moist, dense, well graded to 3 centimeters, subrounded, abundant oxidized weathered clasts.

Increased clay.

Wet along fractured gravel surfaces.

cont....

No. 6650

Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: January 28, 1999
LFR Geologist: Todd Miller, R.G., CH.G.

EXPLANATION

▤ Clay

▤ Silt

▨ Sand

▨ Gravel

PID - Photoionization Detector

▼ Water level at time of drilling

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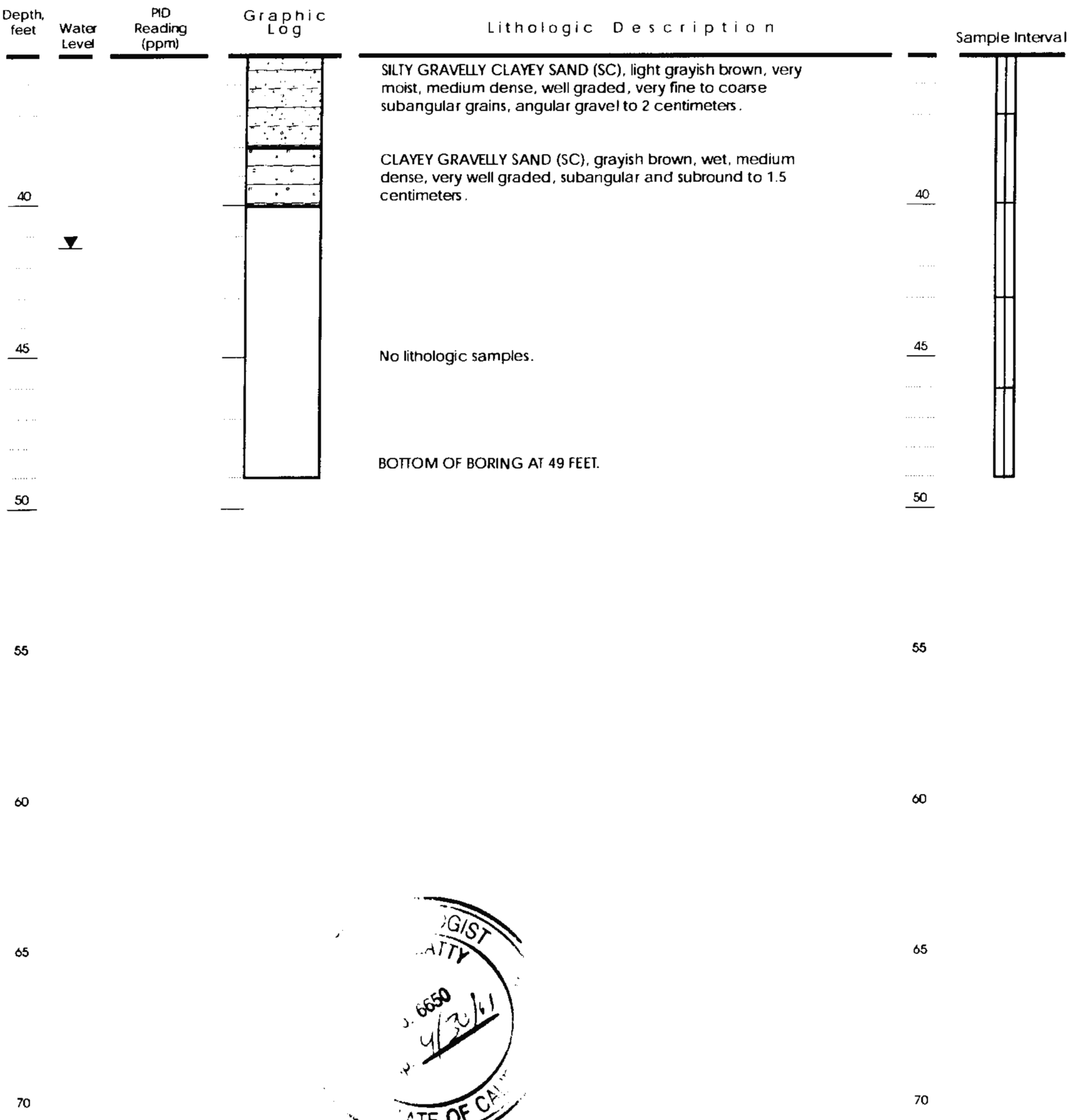
LITHOLOGY FOR 405-BH-01 *(page 1 of 2)*

SCVWD PILOT STUDY



SILTY GRAVELLY CLAYEY SAND (SC), light grayish brown, very moist, medium dense, well graded, very fine to coarse subangular grains, angular gravel to 2 centimeters.

CLAYEY GRAVELLY SAND (SC), grayish brown, wet, medium dense, very well graded, subangular and subround to 1.5 centimeters.

No lithologic samples.

BOTTOM OF BORING AT 49 FEET.

6650

Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: January 28, 1999
LFR Geologist: Todd Miller, R.G., CH.G.

EXPLANATION

▤	Clay
▤	Silt
▨	Sand
▨	Gravel

PID - Photoionization Detector

▼ Water level at time of drilling

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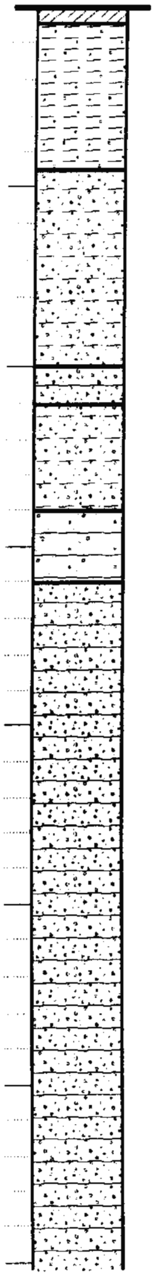
LITHOLOGY FOR 405-BH-01 *(page 2 of 2)*

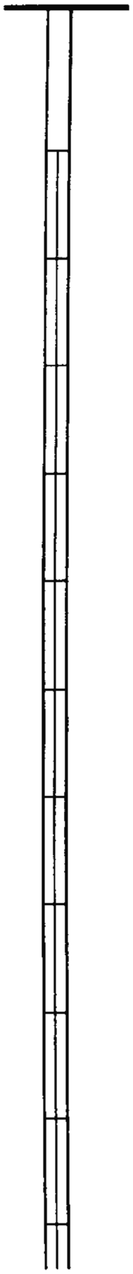
Project No. 6730.00-024

SCVWD PILOT STUDY

Graphic Log



Sample Interval



Depth, feet	Water Level	PID Reading (ppm)	Lithologic Description
			ASPHALT surface.
			GRAVELLY SILT, yellowish brown, slightly moist.
5			SILTY SANDY GRAVEL (GM), dark yellowish brown, slightly moist, medium dense, well graded subangular to 3 centimeters, some cobbles.
10			CLAYEY SANDY GRAVEL (GC), dark brown and grayish brown, very moist, medium dense, subrounded to 1 centimeter.
			SILTY SANDY GRAVEL (GM), light yellowish brown, dry, medium dense, well graded, angular, to cobble size.
15			CLAYEY GRAVELLY SAND (SC), grayish brown, moist, medium dense, coarse grained, subangular, gravel to 1 centimeter.
			CLAYEY SANDY GRAVEL (GC), grayish brown, slightly moist, medium dense, well graded, subangular, clasts to 3 centimeters, cobble at 17 feet.
20			
			Very moist, with highly weathered coarse gravel.
25			
30			
			Siltstone cobble at 31 feet, dry. Very moist to wet from 31.5 to 33 feet.
35			

cont....

J. BEATTY

Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: January 28, 1999
LFR Geologist: Todd Miller, R.G., CH.G.

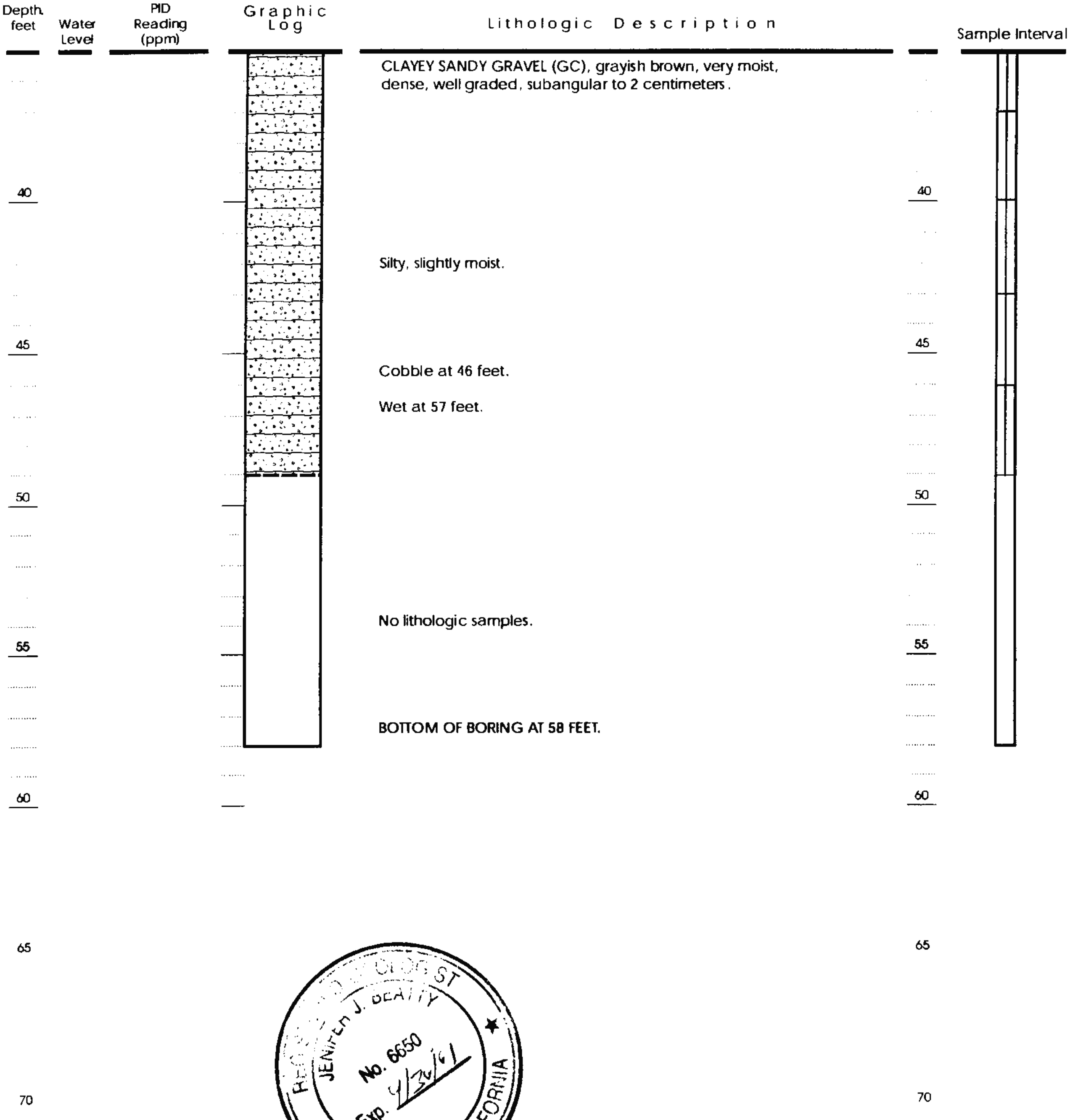
EXPLANATION

☰	Clay
▤	Silt
░	Sand
▒	Gravel

PID - Photoionization Detector

▼ Water level at time of drilling

SCVWD PILOT STUDY



CLAYEY SANDY GRAVEL (GC), grayish brown, very moist, dense, well graded, subangular to 2 centimeters.

Silty, slightly moist.

Cobble at 46 feet.

Wet at 57 feet.

No lithologic samples.

BOTTOM OF BORING AT 58 FEET.

REGISTERED GEOLOGIST
JENNIFER J. BEATTY
No. 6650
Exp. 4/30/01
STATE OF CALIFORNIA

Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: January 28, 1999
LFR Geologist: Todd Miller, R.G., CH.G.

EXPLANATION

▤	Clay
▤	Silt
▨	Sand
▨	Gravel

PID - Photoionization Detector

▼ Water level at time of drilling

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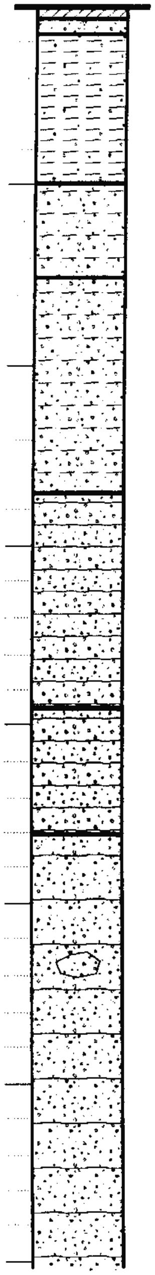
LITHOLOGY FOR 405-BH-02 *(page 2 of 2)*

Project No. 6730.00-024

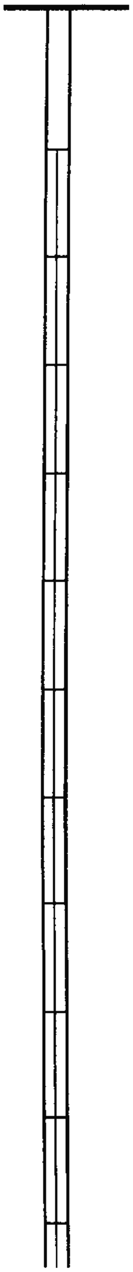
SCVWD PILOT STUDY

Graphic Log



cont....

Sample Interval



Depth, feet	Water Level	PID Reading (ppm)	Lithologic Description
			4" thick ASPHALT.
			6" thick base rock.
			GRAVELLY SILT.
5			
		0.0	SILTY GRAVEL, very poor recovery.
			SILTY SANDY GRAVEL (GM), light yellowish brown, dry to slight moist, loose, well graded, angular to 4 centimeters.
		0.0	
10			
		0.0	Some clay, slightly moist, dense.
			SANDY CLAYEY GRAVEL (GC), dark grayish brown, moist, loose to medium dense, well graded, angular fine gravel.
		0.0	
15			
			Coarse sand interval at 16 feet.
		0.0	
			CLAYEY GRAVEL (GC), grayish brown to light yellowish brown with dark brown inclusions, moist, medium dense, well graded angular to 3 centimeters.
20		0.0	
		0.0	CLAYEY SANDY GRAVEL (GC), light yellowish to grayish brown, slightly moist, medium dense, well graded angular, heterogenous, variegated color and composition.
25			
		0.0	Sandstone cobble.
30		0.0	
		0.0	
35			

JENNIFER J. BEATTY
No. 6650
Exp. 9/30/01

EXPLANATION

▤ Clay

▤ Silt

▨ Sand

▨ Gravel

PID - Photoionization Detector

▼ Water level at time of drilling

Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: January 29, 1999
LFR Geologist: Todd Miller, R.G., CH.G.

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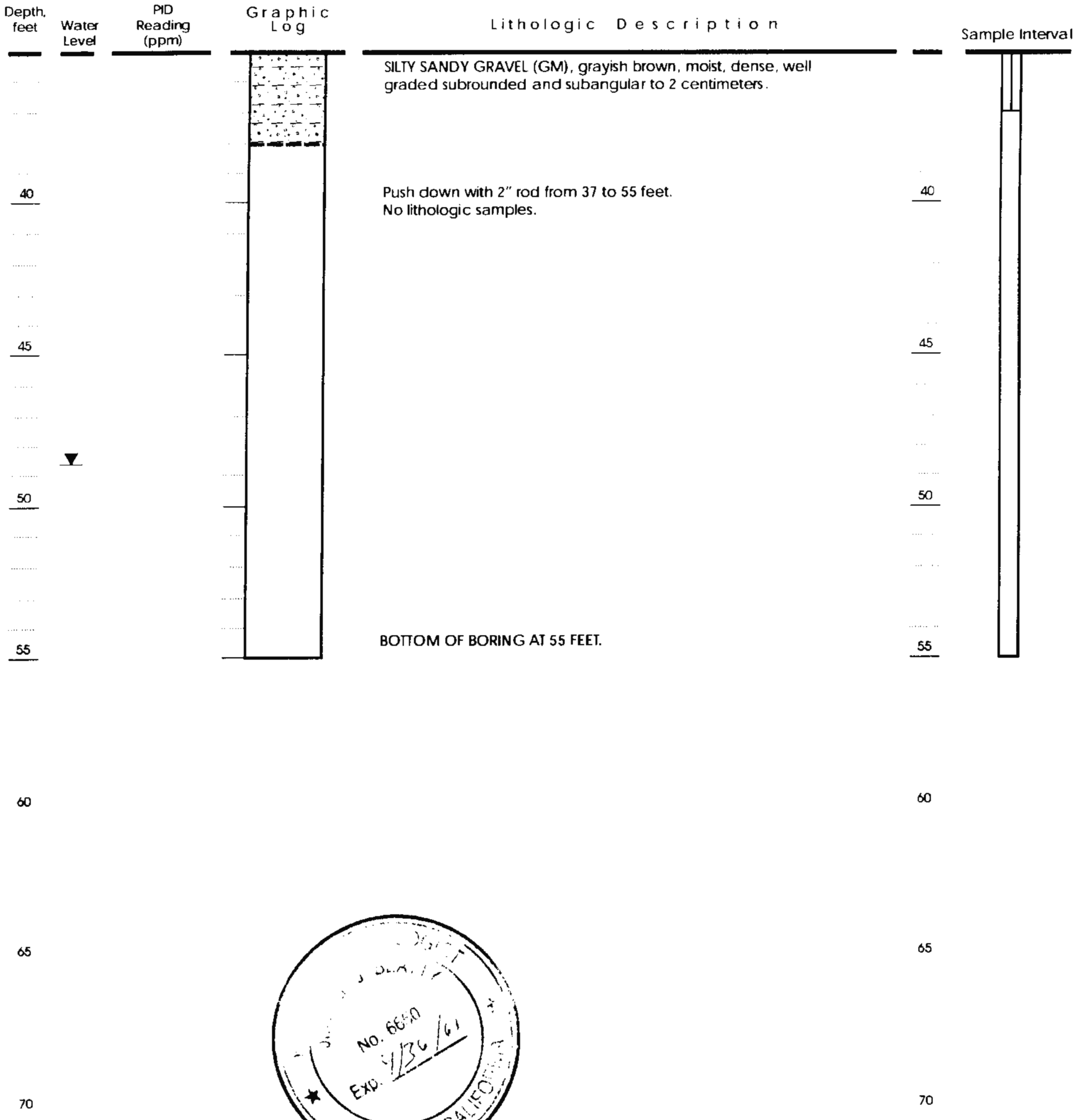
LITHOLOGY FOR 405-BH-03 *(page 1 of 2)*

SCVWD PILOT STUDY



SILTY SANDY GRAVEL (GM), grayish brown, moist, dense, well graded subrounded and subangular to 2 centimeters.

Push down with 2" rod from 37 to 55 feet.
No lithologic samples.

BOTTOM OF BORING AT 55 FEET.

No. 6640
Exp. 1/30/01

Drilling Method:	Dual-Tube/Direct Push
Drilling Company:	Precision
Date Well Drilled:	January 29, 1999
LFR Geologist:	Todd Miller, R.G., CH.G.

EXPLANATION

- ☰ Clay
- ☰ Silt
- ▨ Sand
- ▨ Gravel

PID - Photoionization Detector

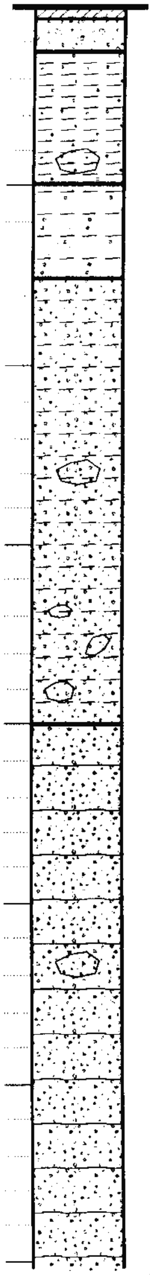
▼ Water level at time of drilling

LITHOLOGY FOR 405-BH-03 *(page 2 of 2)*

LFR LEVINE•FRICKE

Project No. 6730.00-024

SCVWD PILOT STUDY



Depth, feet	Water Level	PID Reading (ppm)	Lithologic Description
			4" thick ASPHALT. Base GRAVEL.
			Silt and gravel.
			Cobble at 4.5 feet.
5			
		0.0	GRAVELLY SILTY SAND (SM), dark yellowish brown, slightly moist to moist, medium dense, well graded, subrounded to 2.5 centimeters.
		0.0	SILTY SANDY GRAVEL (GM), dark yellowish brown, slightly moist, loose, angular, well graded, to cobble size.
10			
		0.0	Dense, angular and subangular, predominantly less than 1 centimeter.
			Siltstone cobble.
		0.0	
15			
		0.0	SILTY SANDY GRAVEL (GM), yellowish brown, slightly moist to dry, medium dense, well graded, angular/subrounded to cobble size, heterogenous.
20		0.0	CLAYEY SANDY GRAVEL (GC), grayish brown with variegated color, moist, medium dense, well graded, subangular, predominantly less than 1 centimeter.
		0.0	
25			
		0.0	Siltstone cobble.
30		0.0	No lithologic samples past 28 feet due to flexing rods. Drive to 55 feet to collect groundwater.
		0.0	
35			

Sample Interval

J. BEATTY
No. 6650
Exp. 9/30/01

Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: January 29, 1999
LFR Geologist: Todd Miller, R.G., CH.G.

EXPLANATION

☰	Clay
▭	Silt
▨	Sand
▨	Gravel

PID - Photoionization Detector

▼ Water level at time of drilling

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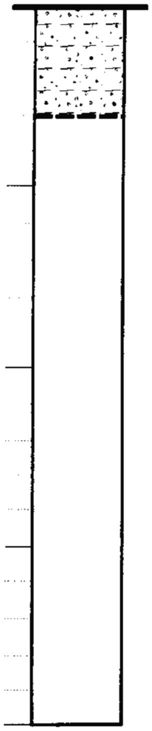
LITHOLOGY FOR 405-BH-04 *(page 1 of 2)*

Project No. 6730.00-024

SCVWD PILOT STUDY

Depth feet	Water Level	PID Reading (ppm)	Lithologic Description
			SILTY SANDY GRAVEL (GM), grayish brown, moist, dense, well graded subrounded and subangular to 2 centimeters.
40			Push down with 2" rod from 37 to 55 feet. No lithologic samples.
45			
	▼		
50			
55			BOTTOM OF BORING AT 55 FEET.
60			
65			
70			

Graphic Log



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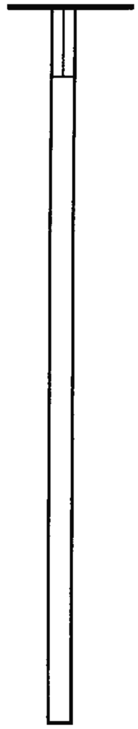


No. 6650
Exp 9/30/01

Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: January 29, 1999
LFR Geologist: Todd Miller, R.G., CH.G.

EXPLANATION

▤	Clay
▤	Silt
▨	Sand
▨	Gravel

PID - Photoionization Detector

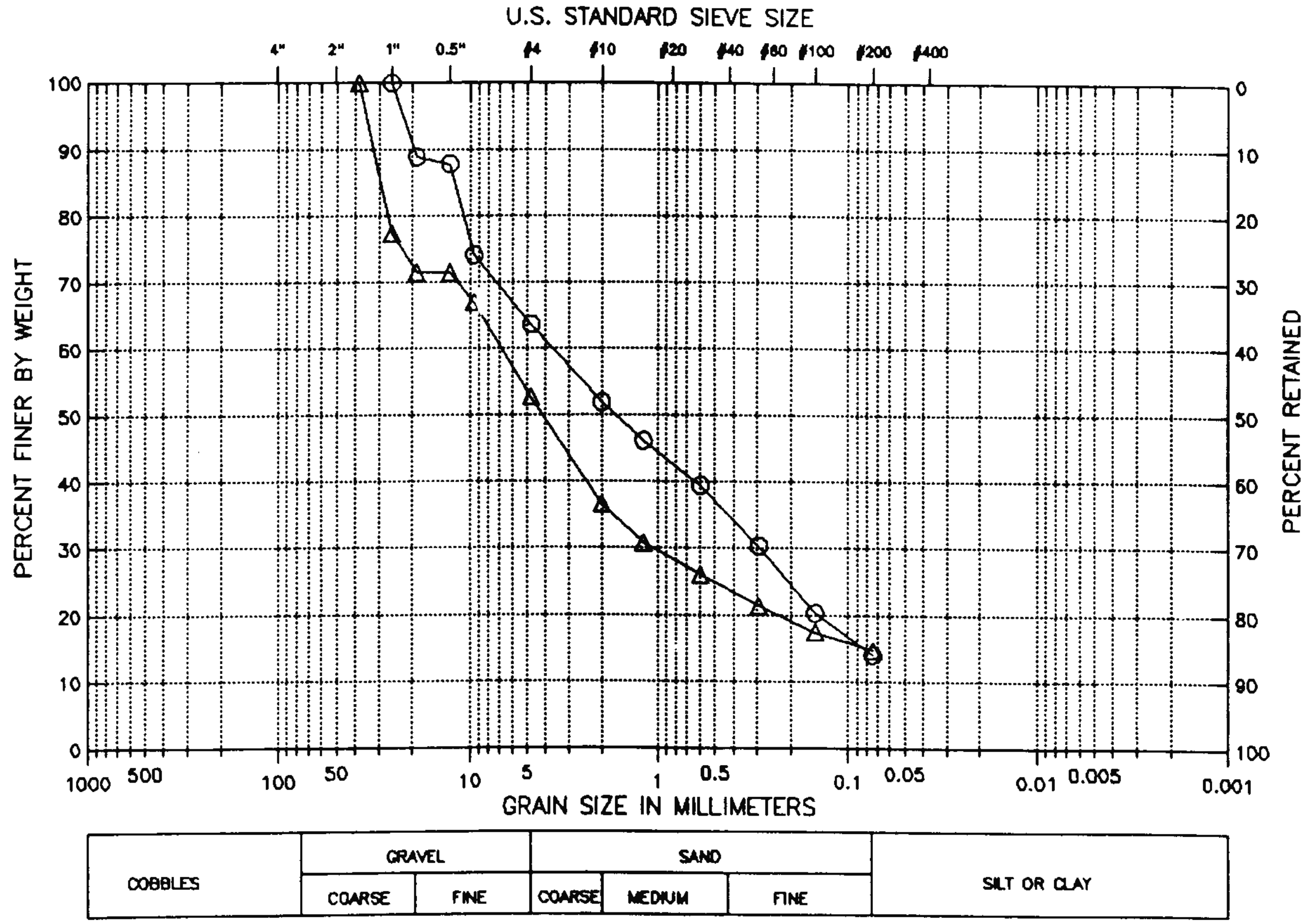
▼ Water level at time of drilling

LFR
LEVINE•FRICKE

LITHOLOGY FOR 405-BH-04 *(page 2 of 2)*

Project No. 6730.00-024

Project : LEVINE FRICKE RECON 6730.00-024
Project No.: 51-0016148A.00
Location: SCVWD MTBE STUDY MORGAN HILL, CA
Date : Tue Feb 23 1999



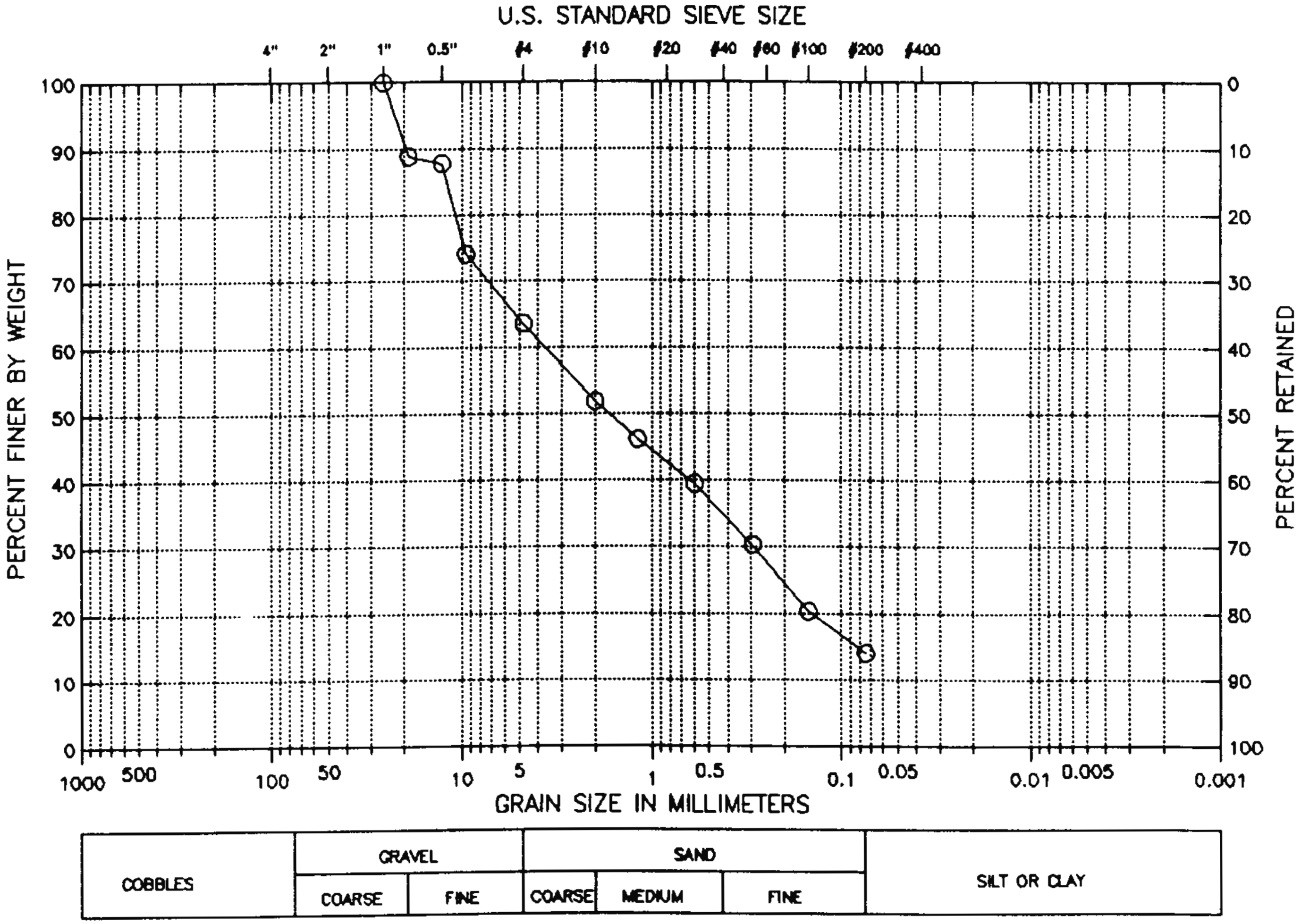
Symbol	Boring No.	Sample No.	Depth	Filename	Classification / Description	
-⊖-	405-BH-01	11.5-12.0 SD	11.5-12.0 feet	405-11	SM	Silty sand with gravel
-△-	405-BH-02	21.0-21.5 SV	21.0-21.5 feet	405-21	GM	Silty gravel with sand

Figure 1

URS Greiner Woodward Clyde

Boring No. : 405-BH-01
Sample No.: 11.5-12.0 SD
Tested by : C. WASON
Filename : 405-11

Project : LEVINE FRICKE RECON 6730.00-024
Project No.: 51-0016148A.00
Location: SCVWD MTBE STUDY MORGAN HILL, CA
Date : Tue Feb 23 1999



Classification :
(SM) Silty sand with gravel
Visual Description :
BROWN GRAVELLY SILTY SAND WITH TRACES OF CLAY

Remarks :
Depth: 11.5-12.0 feet

Figure 1

```
Tue Feb 23 11:12:22 1999                                                        Page :  1

                              GEOTECHNICAL LABORATORY TEST DATA

Project : LEVINE FRICKE RECON  6730.00-024                        Filename : 405-11
Project No. : 51-0016148A.00        Depth : 11.5-12.0 feet         Elevation : NA
Boring No. : 405-BH-01              Test Date : 02/23/99           Tested by : C. WASON
Sample No. : 11.5-12.0 SD           Test Method : ASTM D422        Checked by : S. CAPPS
Location : SCVWD MTBE STUDY  MORGAN HILL, CA
Soil Description : BROWN GRAVELLY SILTY SAND WITH TRACES OF CLAY
Remarks : Depth:  11.5-12.0 feet

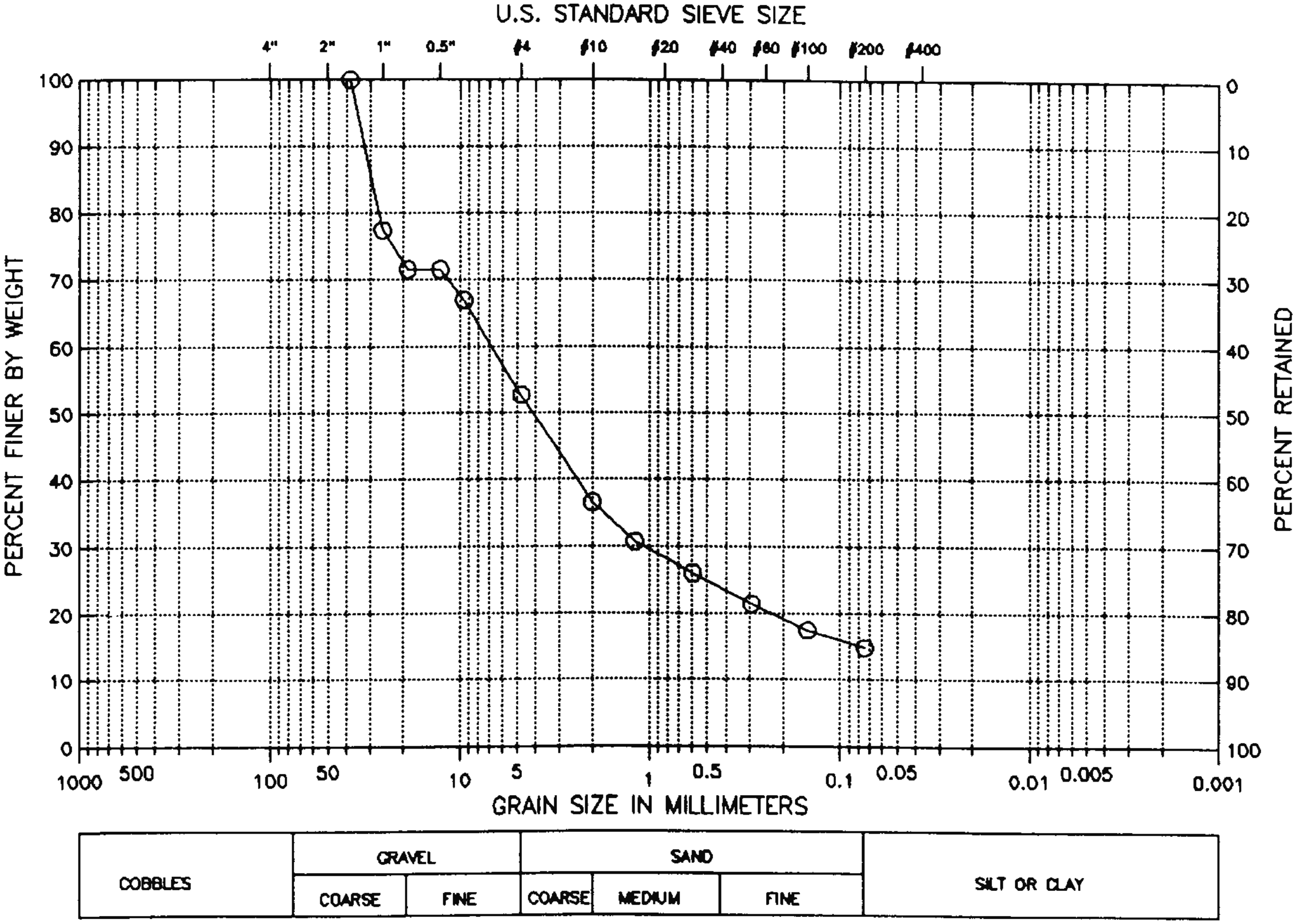
                              COARSE SIEVE SET
Sieve          Sieve Openings         Weight       Cumulative        Percent
Mesh           Inches  Millimeters    Retained     Weight Retained   Finer
                                      (gm)         (gm)              (%)
----------     ------  -----------    --------     ---------------   -------
1"              1.012      25.70         0.00                0.00        100
0.75"           0.748      19.00        28.87               28.87         89
0.5"            0.500      12.70         2.62               31.49         88
0.375"          0.374       9.51        36.02               67.51         74
#4              0.187       4.75        27.39               94.90         64
#10             0.079       2.00        30.59              125.49         52
#16             0.047       1.19        14.99              140.48         46
#30             0.023       0.60        17.41              157.89         40
#50             0.012       0.30        24.07              181.96         30
#100            0.006       0.15        25.94              207.90         20
#200            0.003       0.07        16.30              224.20         14
     Total Dry Weight of Sample = 261.05

 D85 : 11.9416 mm
 D60 : 3.6290 mm
 D50 : 1.6799 mm
 D30 : 0.2890 mm
 D15 : 0.0817 mm
 D10 : 0.0467 mm

 Soil Classification
        ASTM Group Symbol    : SM
        ASTM Group Name      : Silty sand with gravel
        AASHTO Group Symbol  : A-1-b(0)
        AASHTO Group Name    : Stone Fragments, Gravel and Sand
```

Boring No. : 405-BH-02
Sample No.: 21.0-21.5 SV
Tested by : C. WASON
Filename : 405-21

Project : LEVINE FRICKE RECON 6730.00-024
Project No.: 51-0016148A.00
Location: SCVWD MTBE STUDY MORGAN HILL, CA
Date : Tue Feb 23 1999



Classification :
(GM) Silty gravel with sand
Visual Description :
LT./DARK BROWN SANDY GRAVEL

Remarks :
Depth: 21.0-21.5 feet

Figure 1

URS Greiner Woodward Clyde

GEOTECHNICAL LABORATORY TEST DATA

Project : LEVINE FRICKE RECON 6730.00-024
Filename : 405-21
Project No. : 51-0016148A.00
Depth : 21.0-21.5 feet
Elevation : NA
Boring No. : 405-BH-02
Test Date : 02/23/99
Tested by : C. WASON
Sample No. : 21.0-21.5 SV
Test Method : ASTM D422
Checked by : S. CAPPS
Location : SCVWD MTBE STUDY MORGAN HILL, CA
Soil Description : LT./DARK BROWN SANDY GRAVEL
Remarks : Depth: 21.0-21.5 feet

COARSE SIEVE SET

Sieve Mesh	Sieve Openings Inches	Millimeters	Weight Retained (gm)	Cumulative Weight Retained (gm)	Percent Finer (%)
1.5"	1.500	38.10	0.00	0.00	100
1"	1.012	25.70	60.21	60.21	77
0.75"	0.748	19.00	15.69	75.90	72
0.5"	0.500	12.70	0.00	75.90	72
0.375"	0.374	9.51	12.22	88.12	67
#4	0.187	4.75	37.97	126.09	53
#10	0.079	2.00	43.06	169.15	37
#16	0.047	1.19	15.70	184.85	31
#30	0.023	0.60	12.35	197.20	26
#50	0.012	0.30	12.30	209.50	21
#100	0.006	0.15	10.60	220.10	17
#200	0.003	0.07	7.20	227.30	15

Total Dry Weight of Sample = 266.72

D85 : 29.3295 mm
D60 : 6.7725 mm
D50 : 4.1046 mm
D30 : 1.0724 mm
D15 : 0.0784 mm
D10 : 0.0214 mm

Soil Classification
ASTM Group Symbol : GM
ASTM Group Name : Silty gravel with sand
AASHTO Group Symbol : A-1-a(0)
AASHTO Group Name : Stone Fragments, Gravel and Sand

SANTA CLARA VALLEY WATER DISTRICT
Pilot Study of Operating Underground Storage Tanks
Santa Clara County, California

Site Report

SITE NUMBER 422

Spencer Service Inc
6991 Monterey Street
Gilroy, California 95020

May 13, 1999

This Site Report is one of a series of reports prepared for the Santa Clara Valley Water District's Pilot Study of Operating Underground Storage Tanks. The District funded this study to assess if MtBE is being released from UST systems that meet 1998 federal- and state-mandated upgrade requirements. The District will use the results of the Pilot Study, and possibly information obtained during subsequent investigations, to evaluate whether up-graded UST systems that handle MtBE are protective of groundwater quality, and ultimately drinking water. This Study and other District groundwater vulnerability assessments are critical in formulating a plan to protect drinking water supplies into the future.

With assistance from the Gilroy Fire Department, LFR Levine·Fricke completed a file review and conducted soil and groundwater sampling adjacent to this site on behalf of the District. This report provides a brief summary of investigation findings, and site-specific data in tables, figures, and appendices. This Site Report is appended to the Summary Report for the Study.

LFR
LEVINE•FRICKE
1900 Powell Street, 12th Floor
Emeryville, California 94608-1827
(510) 652-4500/Fax (510) 652-2246

SUMMARY OF FINDINGS

SITE DESCRIPTION

Figure 1 illustrates the site location. The geology beneath this site is very heterogeneous. In some of the borings, sands were encountered to approximately 5 to 8 feet below the ground surface (bgs) underlain by clays and gravels to 20 feet bgs. In other borings, silts and clays were encountered to approximately 8 to 10 feet bgs underlain by gravelly clays/clayey gravels and sands to approximately 20 feet bgs. The shallowest depth to groundwater measured was approximately 17.5 feet bgs.

SYSTEM DESCRIPTION

Records indicate that the UST system at the site consists of two double-walled gasoline USTs (10,000-gallon and 15,000-gallon) and one 5,000-gallon diesel UST. The gasoline USTs are constructed of steel clad with fiberglass reinforced plastic [FRP], and double-walled fiberglass piping. While the piping leak detection method was not noted, records indicate that the gasoline UST system utilizes continuous interstitial monitoring for UST leak detection. Field observations indicate the UST system utilizes a balanced vapor recovery system.

RESULTS

MtBE was not detected in the 14 soil samples or 6 groundwater samples collected from borings drilled adjacent to this Site. Toluene and xylene were detected in 1 of the 6 groundwater samples at concentrations of 0.57 μg/l and 0.54 μg/l, respectively.

SITE SELECTION CRITERIA MET

1998 upgrade compliant?	Yes
On SCVWD fuel leak database?	No
Status:	Not applicable
Distance from LUST site:	Greater than 250 feet
Distance to water supply well:	Less than 2000 feet
Access granted?	No
SCVWD approved?	Yes

FILE REVIEW SUMMARY

Number of tanks:	3
Reported release?	No
Release date:	Not applicable
Fuel released:	Not applicable
Location:	Not applicable
Quantity (gallons):	Not applicable
Data available:	Not applicable

Comments:

Form B information for 5,000-gallon diesel UST not gathered.

SITE VISIT - UST SYSTEM INFORMATION

UST system inspection not conducted for off-site investigations.

SITE INSPECTION

Site inspection not conducted for off-site investigations.

UST SYSTEM DATA FROM FORM B COLLECTED DURING FILE REVIEWS - TANK ID # M230082

Date installed:	4/23/97
Tank capacity (gallons):	15,000
Tank contents:	Regular unleaded
Tank construction:	
Type of system:	Double wall
Tank material (primary tank):	Steel-clad with fiberglass reinforced plastic
Lining compatible with 100% methanol:	No
Exterior corrosion protection:	Fiberglass reinforced plastic
Date spill containment installed:	1997
Date overfill protection equipment installed:	1997
Drop tube:	Not noted
Striker plate:	Not noted
Dispenser containment:	Not noted
Piping information:	
System type:	Pressure, underground
Construction:	Double wall, underground
Material and corrosion protection:	Fiberglass pipe, underground
Leak detection:	
Tank leak detection?	Automatic tank gauging Annual tank testing Continuous interstitial monitoring

UST SYSTEM DATA FROM FORM B COLLECTED DURING FILE REVIEWS - TANK ID # M230083

Date installed:	4/23/97
Tank capacity (gallons):	10,000
Tank contents:	Premium unleaded
Tank construction:	
Type of system:	Double wall
Tank material (primary tank):	Steel-clad with fiberglass reinforced plastic

Lining compatible with 100% methanol:	No
Exterior corrosion protection:	Fiberglass reinforced plastic
Date spill containment installed:	Not noted
Date overfill protection equipment installed:	Not noted
Drop tube:	Not noted
Striker plate:	Not noted
Dispenser containment:	Not noted
Piping information:	
System type:	Pressure, underground
Construction:	Double wall, underground
Material and corrosion protection:	Fiberglass pipe, underground
Leak detection:	
Tank leak detection?	Automatic tank gauging Annual tank testing Continuous interstitial monitoring

Table 1
Summary of Chemical Analysis Results for Soil Samples - Site #422
Santa Clara Valley Water District

Location	Date Sampled	Depth (ft bgs)	Methyl Tertiary Butyl Ether (MTBE) ug/Kg	TPH as Gasoline (TPHg) mg/Kg	Benzene (B) ug/Kg	Toluene (T) ug/Kg	Ethyl Benzene (E) ug/Kg	meta/para-Xylenes (m/p-X) ug/Kg	ortho-Xylene (o-X) ug/Kg	Di-isopropyl Ether (DIPE) ug/Kg	Ethyl Tertiary Butyl Ether (ETBE) ug/Kg	Tertiary Amyl Methyl Ether (TAME) ug/Kg	Tertiary Butyl Alcohol (TBA) ug/Kg
422-BH-01	03/19/99	7.5-8.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		18.5-19.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
422-BH-02	03/22/99	14.5-15.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		17.0-17.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		18.0-18.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
422-BH-03	03/22/99	5.5-6.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		13.5-14.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		19.5-20.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
422-BH-04	03/23/99	5.5-6.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		16.0-16.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		19.5-20.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
422-BH-05	03/23/99	6.0-6.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		15.0-15.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		17.5-18.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200

Table proofed by CLC.

Notes:

All samples were analyzed by Alpha Analytical, Inc. of Sparks, NV, using EPA Method 8260 for MTBE, BTEX, DIPE, ETBE, TAME, and TBA, and Modified EPA Method 8015 for TPHg.

ft bgs = feet below ground surface

mg/Kg = milligrams per kilogram

TPH = total petroleum hydrocarbons

ug/Kg = micrograms per kilogram

Data Qualifiers (if shown on table):

J = Estimated value

UJ =Not detected at the estimated reporting limit shown

Table 2
Summary of Chemical Analysis Results for Groundwater Samples - Site # 422
Santa Clara Valley Water District

Location	Date Sampled	Depth (ft bgs)	Methyl Tertiary Butyl Ether (MTBE) ug/L	TPH as Gasoline (TPHg) mg/L	Benzene (B) ug/L	Toluene (T) ug/L	Ethyl Benzene (E) ug/L	meta/para-Xylenes (m/p-X) ug/L	ortho-Xylene (o-X) ug/L	Di-isopropyl Ether (DIPE) ug/L	Ethyl Tertiary Butyl Ether (ETBE) ug/L	Tertiary Amyl Methyl Ether (TAME) ug/L	Tertiary Butyl Alcohol (TBA) ug/L
422-BH-01	03/19/99	18.5-20.0	<0.5	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<10
422-BH-02	03/22/99	18.7-20.0	<0.5	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<10
422-BH-02-DUP		18.7-20.0	<0.5	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<10
422-BH-03	03/23/99	18.5-20.0	<0.5	<0.05	<0.5	0.57	<0.5	0.54	<0.5	<1	<1	<1	<10
422-BH-04	03/23/99	18.0-20.0	<0.5	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<10
422-BH-05	03/23/99	18.0-20.0	<0.5	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<10

Table proofed by CLC.

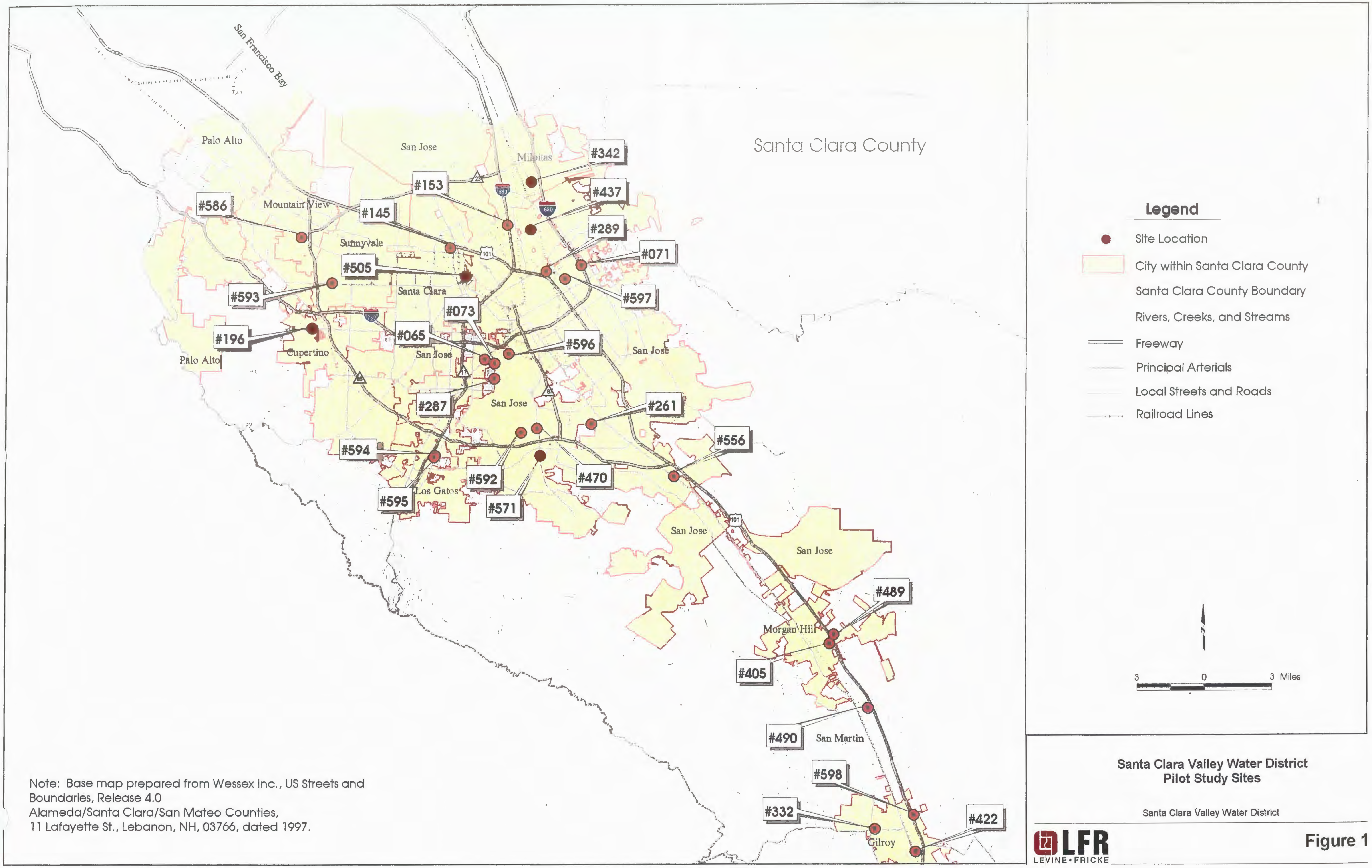
Notes:

All primary and field duplicate (-DUP) samples were analyzed by Alpha Analytical, Inc. of Sparks, NV, using EPA Method 8260 for MTBE, BTEX, DIPE, ETBE, TAME, and TBA, and Modified EPA Method 8015 for TPHg.

ft bgs = feet below ground surface
mg/L = milligrams per liter
TPH = total petroleum hydrocarbons
ug/L = micrograms per liter

Data Qualifiers (if shown on table):

J = Estimated value
UJ =Not detected at the estimated reporting limit shown



Note: Base map prepared from Wessex Inc., US Streets and Boundaries, Release 4.0
Alameda/Santa Clara/San Mateo Counties,
11 Lafayette St., Lebanon, NH, 03766, dated 1997.

Santa Clara Valley Water District
Pilot Study Sites

Santa Clara Valley Water District

LFR
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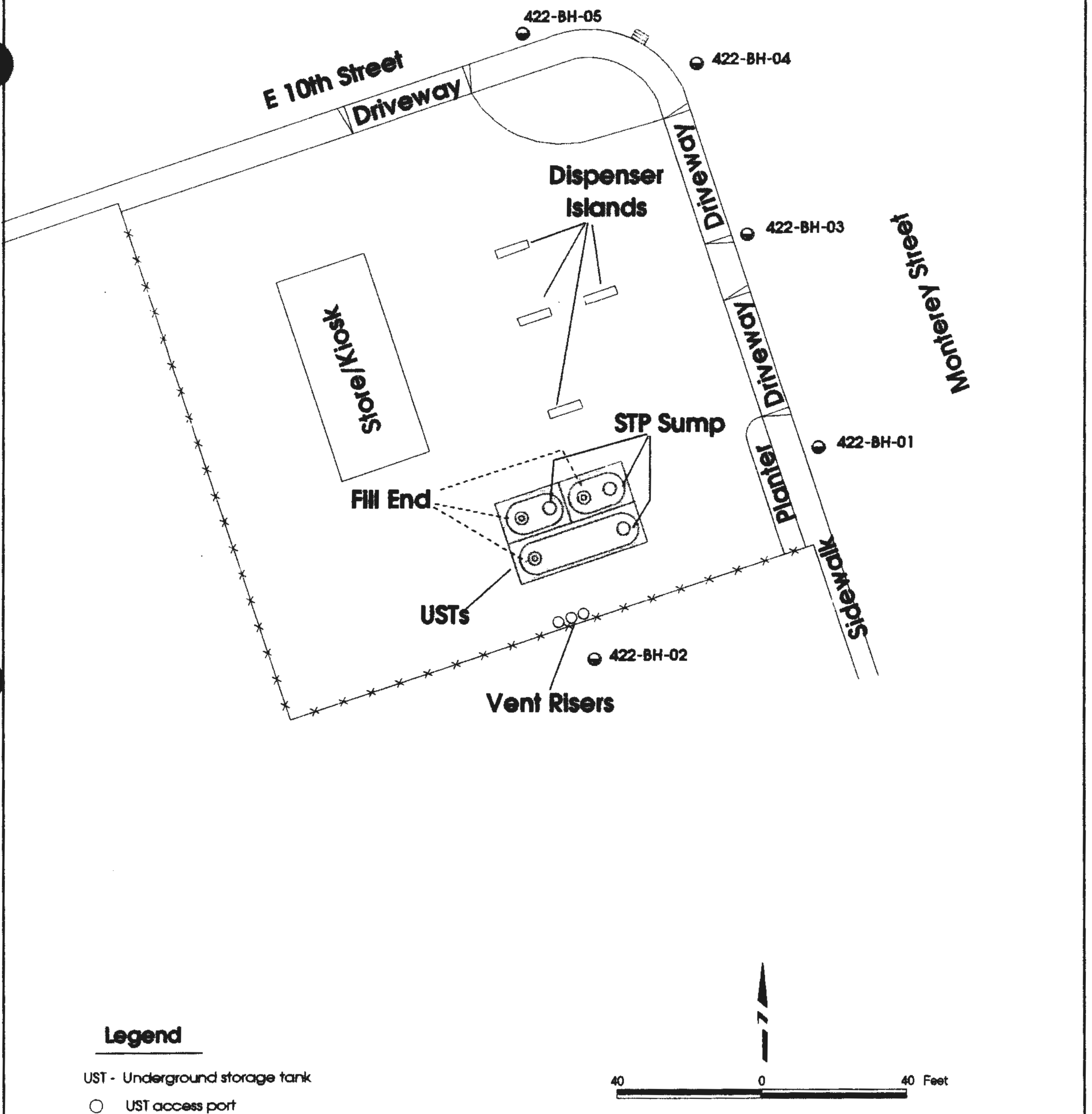
Figure 1



Legend

UST - Underground storage tank

○ UST access port

STP - Submersible turbine pump

□ Concrete slab

▤ Storm Drain Catch Basin

◓ Soil and groundwater sampling location

Note: Base map prepared from LFR field plan.

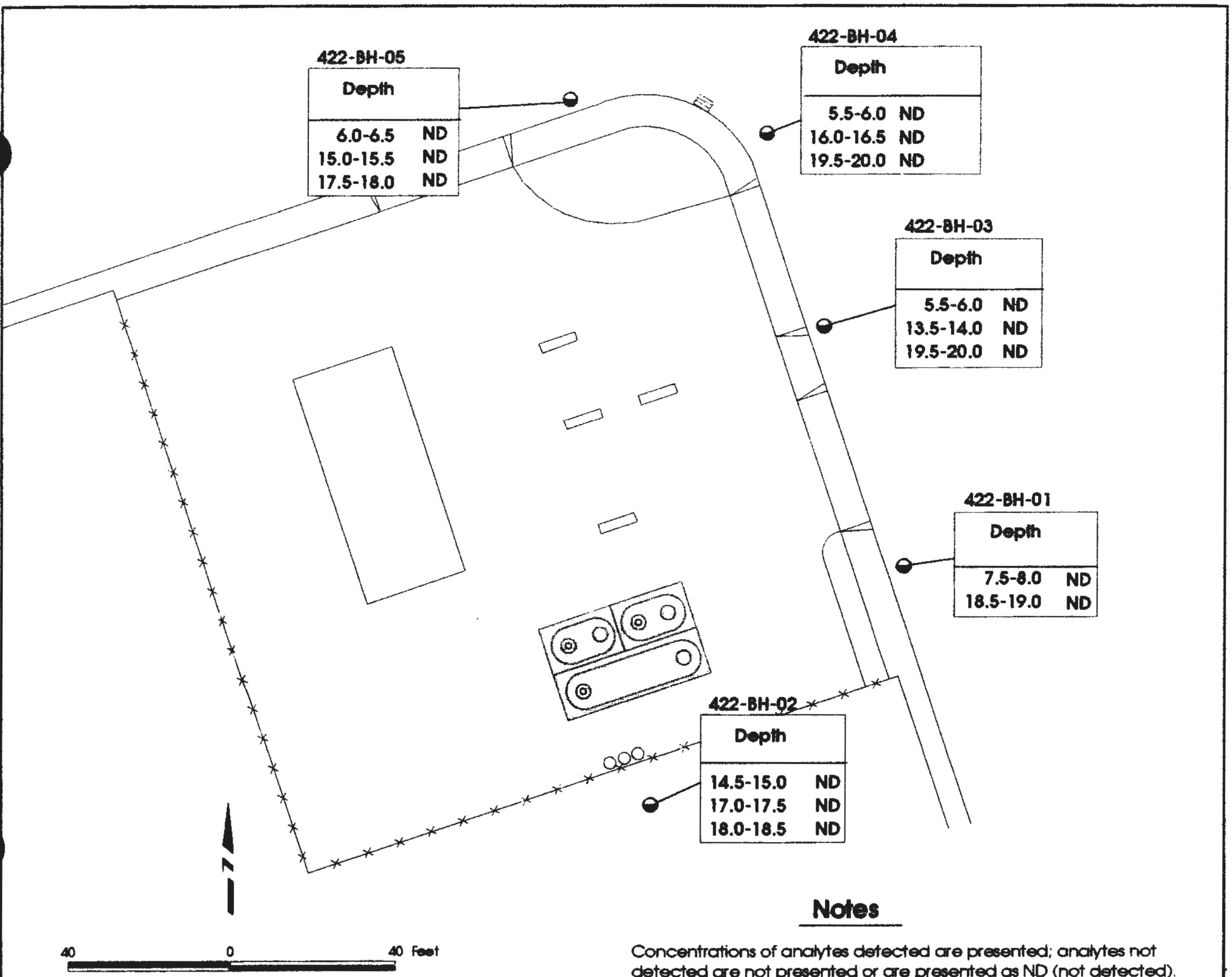
Site #422

Site Plan

Santa Clara Valley Water District

LFR LEVINE•FRICKE

Figure 2



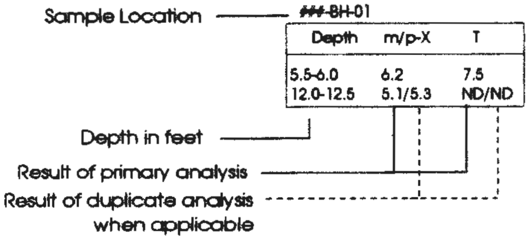
Legend

◒ Soil and groundwater sampling location

UST - Underground storage tank

○ UST access port

The following represents a hypothetical sampling point and defines the characters associated with that point:



☐ Concrete slab

▤ Storm Drain Catch Basin

See Figure 2 for description of site features and origin of base map.

Notes

Concentrations of analytes detected are presented; analytes not detected are not presented or are presented as ND (not detected). TPHg was analyzed using Modified EPA Method 8015, all other analytes were analyzed using EPA Method 8260.

Results in micrograms/kilogram (ug/Kg) for all compounds except TPHg which is presented in milligrams/kilogram (mg/Kg).

RL = Reporting Limit

Each sample was analyzed for the following:

MTBE = Methyl Tertiary Butyl Ether (RL = 5 ug/Kg)
TPHg = Total Petroleum Hydrocarbons as Gasoline (RL = 1 mg/Kg)
B = Benzene (RL = 5 ug/Kg)
T = Toluene (RL = 5 ug/Kg)
E = Ethyl Benzene (RL = 5 ug/Kg)
m/p-X = meta/para-Xylenes (RL = 5 ug/Kg)
o-X = ortho-Xylene (RL = 5 ug/Kg)
DIPE = Di-isopropyl Ether (RL = 20 ug/Kg)
ETBE = Ethyl Tertiary Butyl Ether (RL = 20 ug/Kg)
TAME = Tertiary Amyl Methyl Ether (RL = 20 ug/Kg)
TBA = Tertiary Butyl Alcohol (RL = 200 ug/Kg)

Site #422

Summary of Chemical Analysis Results for Soil Samples

Santa Clara Valley Water District

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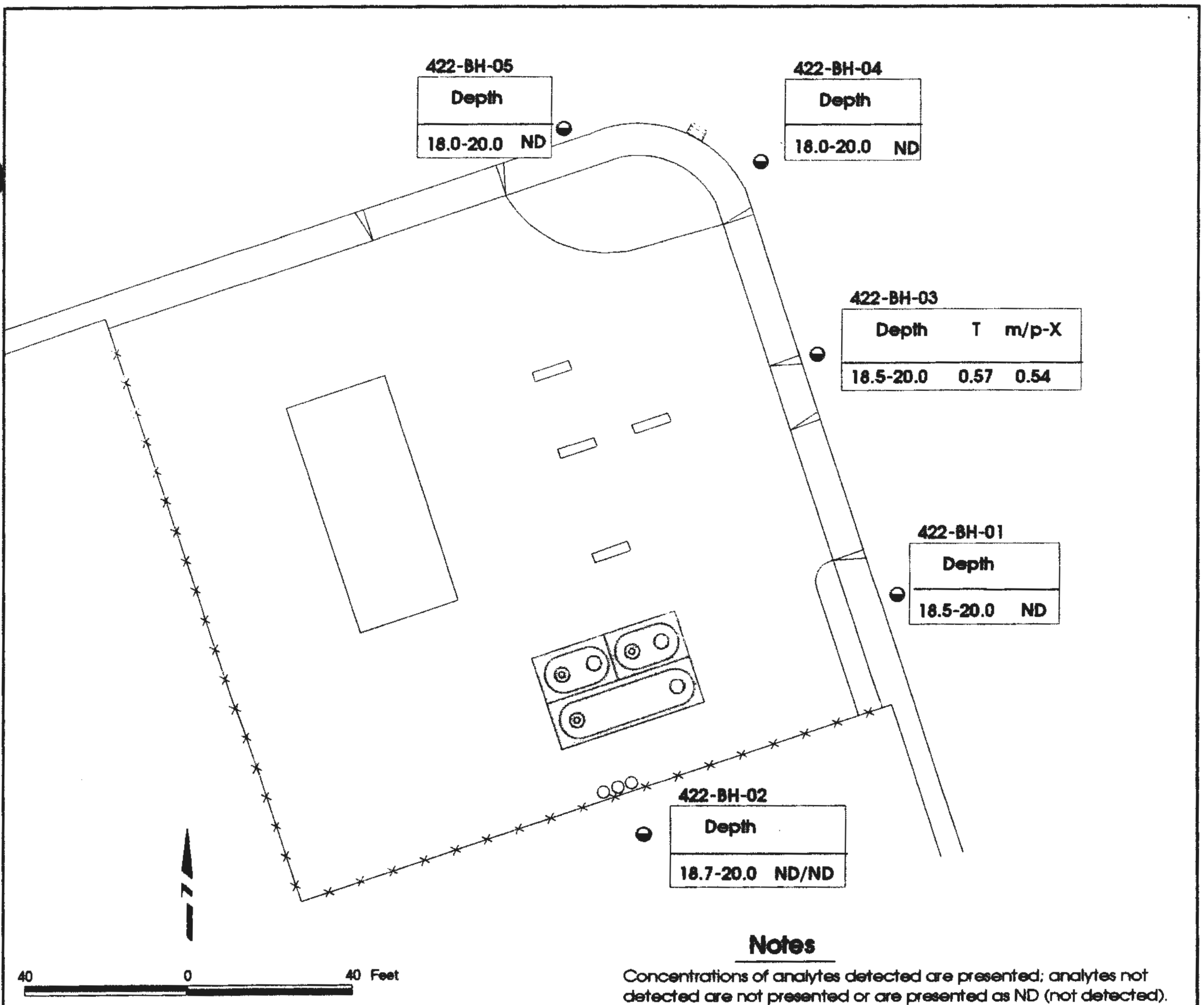
Figure 3



Notes

Concentrations of analytes detected are presented; analytes not detected are not presented or are presented as ND (not detected). TPHg was analyzed using Modified EPA Method 8015, all other analytes were analyzed using EPA Method 8260.

Results in micrograms/liter (ug/L) for all compounds except TPHg which is presented in milligrams/liter (mg/L).

RL = Reporting Limit

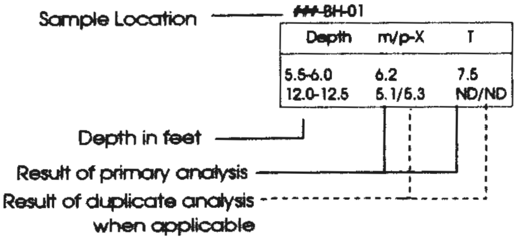
Each sample was analyzed for the following:

MTBE = Methyl Tertiary Butyl Ether (RL = 0.5 ug/L)
TPHg = Total Petroleum Hydrocarbons as Gasoline (RL = 0.05 mg/L)
B = Benzene (RL = 0.5 ug/L)
T = Toluene (RL = 0.5 ug/L)
E = Ethyl Benzene (RL = 0.5 ug/L)
m/p-X = meta/para-Xylenes (RL = 0.5 ug/L)
o-X = ortho-Xylene (RL = 0.5 ug/L)
DIPE = Di-isopropyl Ether (RL = 1 ug/L)
ETBE = Ethyl Tertiary Butyl Ether (RL = 1 ug/L)
TAME = Tertiary Amyl Methyl Ether (RL = 1 ug/L)
TBA = Tertiary Butyl Alcohol (RL = 10 ug/L)

Legend

◒ Soil and groundwater sampling location
UST - Underground storage tank
○ UST access port

The following represents a hypothetical sampling point and defines the characters associated with that point:



▭ Concrete slab

▤ Storm Drain Catch Basin

See Figure 2 for description of site features and origin of base map.

Site #422

Summary of Chemical Analysis Results for Groundwater Samples

Santa Clara Valley Water District

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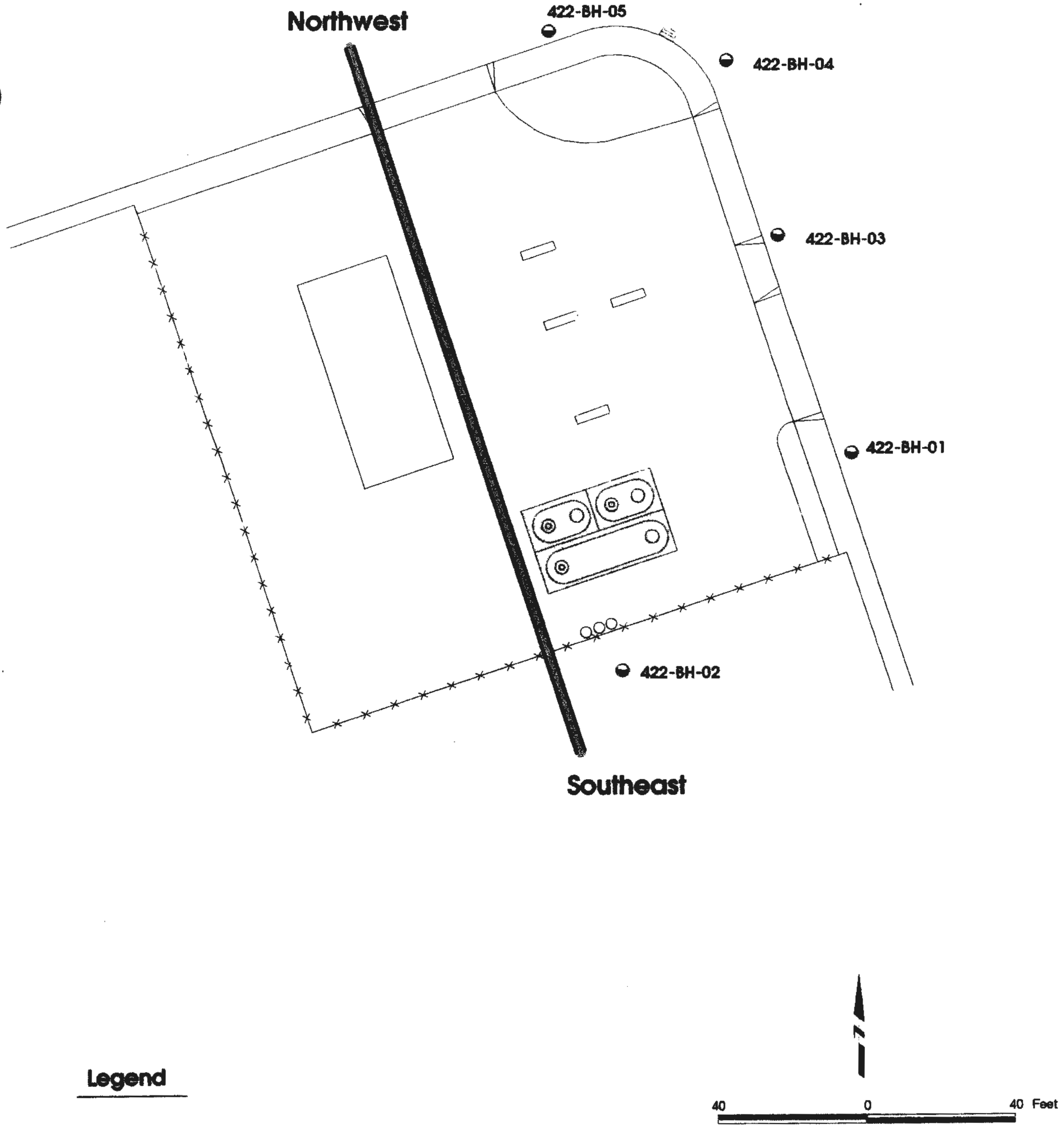
Figure 4

u:\scvwd\gis\422.apr



Legend

◒ Soil and groundwater sampling location

UST - Underground storage tank

○ UST access port

▭ Concrete slab

☰ Storm Drain Catch Basin

See Figure 2 for description of site features and origin of base map.

Site #422

Site Plan Showing Orientation of Vertical Profile

Santa Clara Valley Water District

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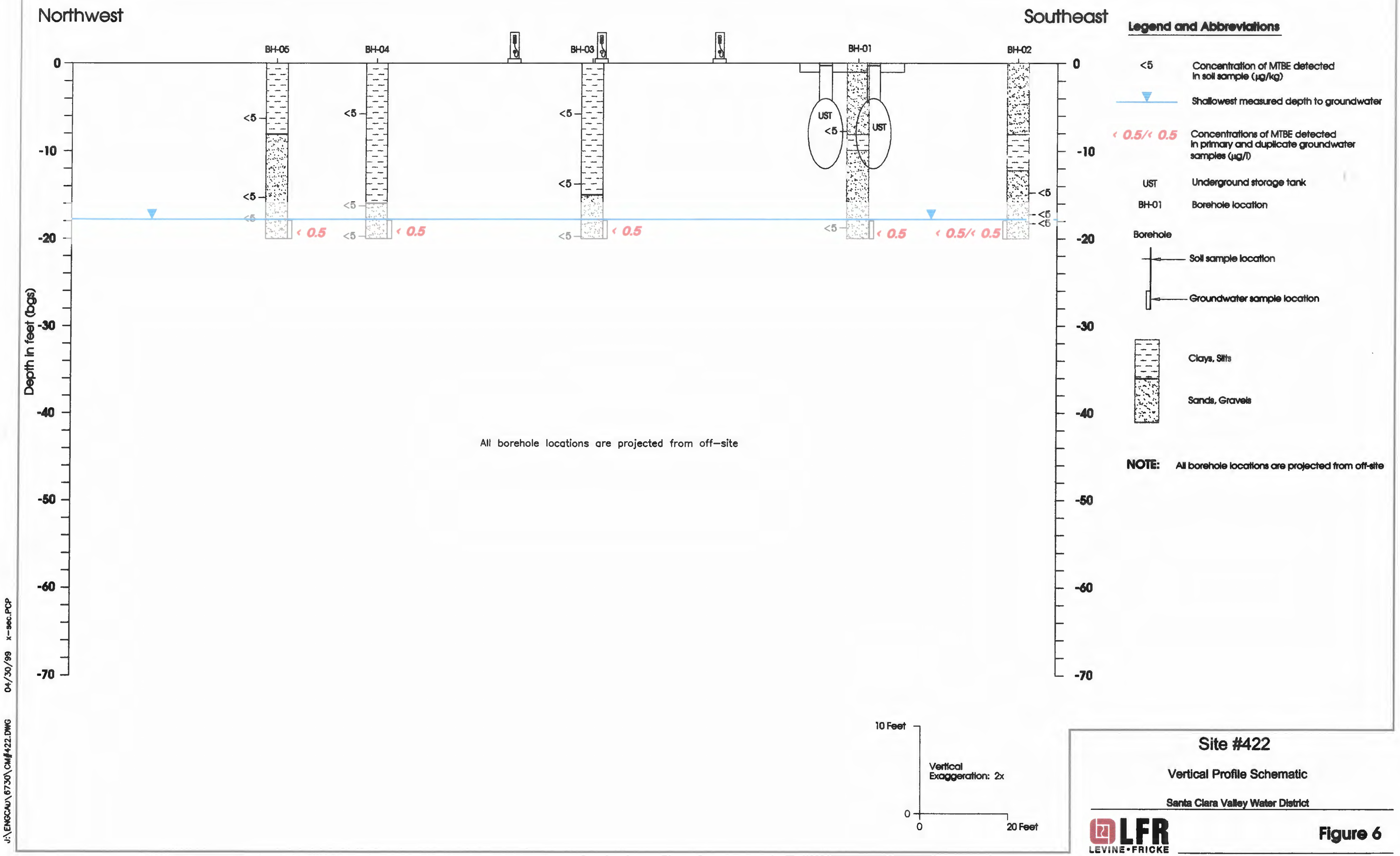
Figure 5



Northwest
Southeast
BH-05
BH-04
BH-03
BH-01
BH-02
0
-10
-20
-30
-40
-50
-60
-70
Depth in feet (bgs)
<5
‹ 0.5
‹ 0.5/‹ 0.5
UST
All borehole locations are projected from off–site
Legend and Abbreviations
<5
Concentration of MTBE detected in soil sample (µg/kg)
Shallowest measured depth to groundwater
‹ 0.5/‹ 0.5
Concentrations of MTBE detected in primary and duplicate groundwater samples (µg/l)
UST
Underground storage tank
BH-01
Borehole location
Borehole
Soil sample location
Groundwater sample location
Clays, Silts
Sands, Gravels
NOTE: All borehole locations are projected from off-site
10 Feet
0
0
20 Feet
Vertical Exaggeration: 2x

J:\ENGCAD\6730\CM\#422.DWG 04/30/99 x-sec.PCP

Site #422

Vertical Profile Schematic

Santa Clara Valley Water District

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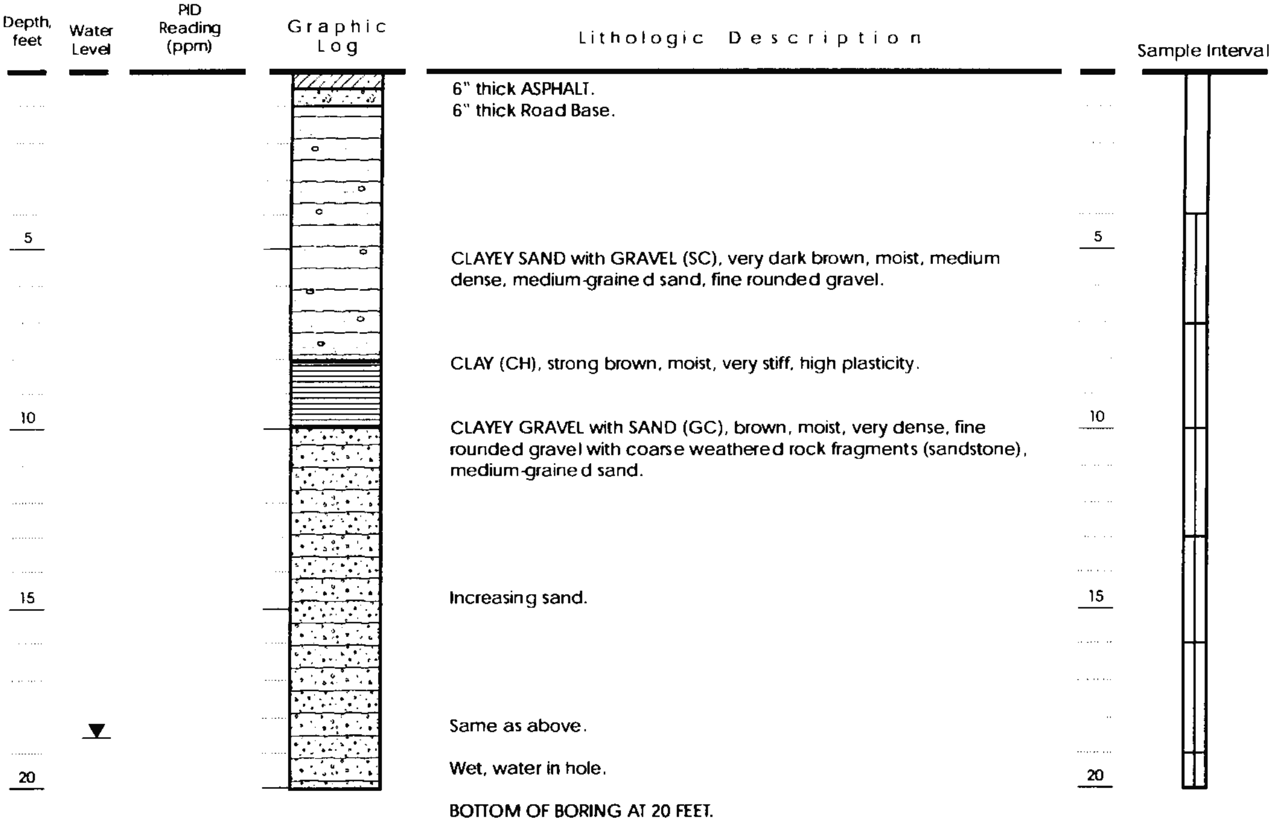
Figure 6

SCVWD PILOT STUDY



6" thick ASPHALT.
6" thick Road Base.

CLAYEY SAND with GRAVEL (SC), very dark brown, moist, medium dense, medium-grained sand, fine rounded gravel.

CLAY (CH), strong brown, moist, very stiff, high plasticity.

CLAYEY GRAVEL with SAND (GC), brown, moist, very dense, fine rounded gravel with coarse weathered rock fragments (sandstone), medium-grained sand.

Increasing sand.

Same as above.

Wet, water in hole.

BOTTOM OF BORING AT 20 FEET.

REGISTERED GEOLOGIST
JENNIFER J. BEATTY
No. 6650
Exp. 4/30/01
STATE OF CALIFORNIA

Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: March 19, 1999
LFR Geologist: Rodney Crother, R.G., CH.G.

EXPLANATION

▤	Clay
▤	Silt
▨	Sand
▨	Gravel

PID - Photoionization Detector

▼ Water level at time of drilling

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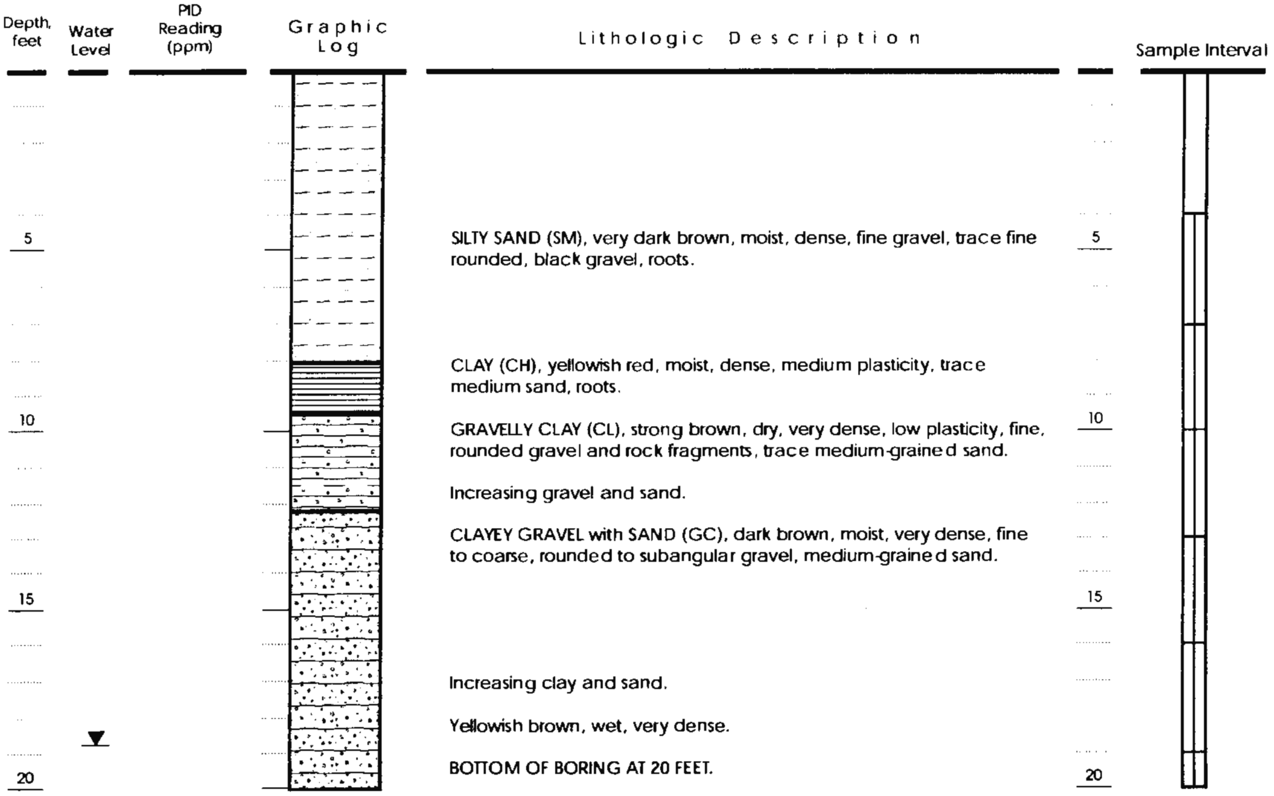
LITHOLOGY FOR 422-BH-01 *(page 1 of 1)*

Project No. 6730.00-024

SCVWD PILOT STUDY



SILTY SAND (SM), very dark brown, moist, dense, fine gravel, trace fine rounded, black gravel, roots.

CLAY (CH), yellowish red, moist, dense, medium plasticity, trace medium sand, roots.

GRAVELLY CLAY (CL), strong brown, dry, very dense, low plasticity, fine, rounded gravel and rock fragments, trace medium-grained sand.

Increasing gravel and sand.

CLAYEY GRAVEL with SAND (GC), dark brown, moist, very dense, fine to coarse, rounded to subangular gravel, medium-grained sand.

Increasing clay and sand.

Yellowish brown, wet, very dense.

BOTTOM OF BORING AT 20 FEET.

JENNIFER J. BEATTY
No. 6650
Exp 9/30/01

Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: March 22, 1999
LFR Geologist: Rodney Crother, R.G., CH.G.

EXPLANATION

☰	Clay
☷	Silt
░	Sand
▒	Gravel

PID - Photoionization Detector

▼ Water level at time of drilling

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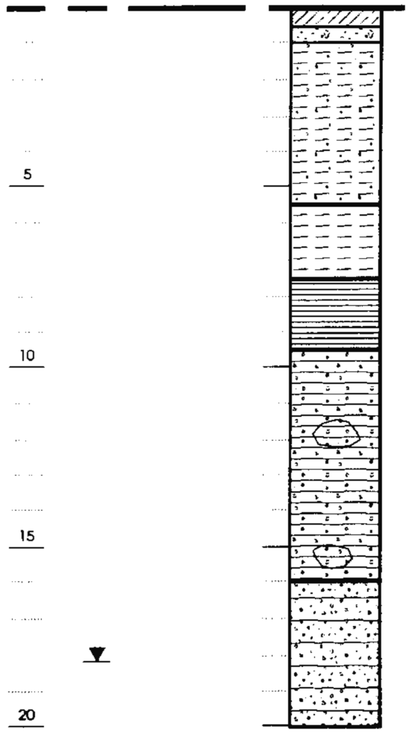
LITHOLOGY FOR 422-BH-02 *(page 1 of 1)*

Project No. 6730.00-024

SCVWD PILOT STUDY

Depth feet | Water Level | PID Reading (ppm) | Graphic Log | Lithologic Description | Sample Interval



6" thick ASPHALT.
6" thick Road Base.

GRAVELLY SILT with SAND (ML), very dark brown, moist, low to medium plasticity, fine rounded gravel, medium sand.

SILT (MH), very dark brown, moist, loose, medium to high plasticity, trace medium sand.

CLAY (CH), brown, moist, stiff, high plasticity, trace medium sand.

GRAVELLY CLAY (CH), brown, moist, very hard, high plasticity, fine rounded gravel, trace medium sand.

Cobble.

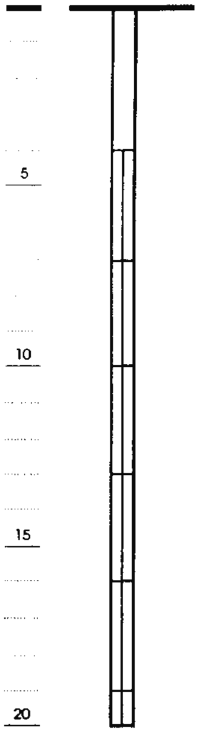
20-40% fine to coarse, rounded to subangular gravel and weathered rock fragments.

Increasing medium-grained sand.
Cobble.

CLAYEY GRAVEL with SAND (GC), dark brown, moist, very dense, high plasticity, fine to coarse, rounded to subangular gravel, fines, medium sand.

Wet.

BOTTOM OF BORING AT 20 FEET.



REGISTERED GEOLOGIST
JENIFER J. BEATTY
No. 6650
Exp. 4/30/01

Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: March 23, 1999
LFR Geologist: Rodney Crother, R.G., CH.G.

EXPLANATION

▤	Clay
☰	Silt
░	Sand
▒	Gravel

PID - Photoionization Detector

▼ Water level at time of drilling

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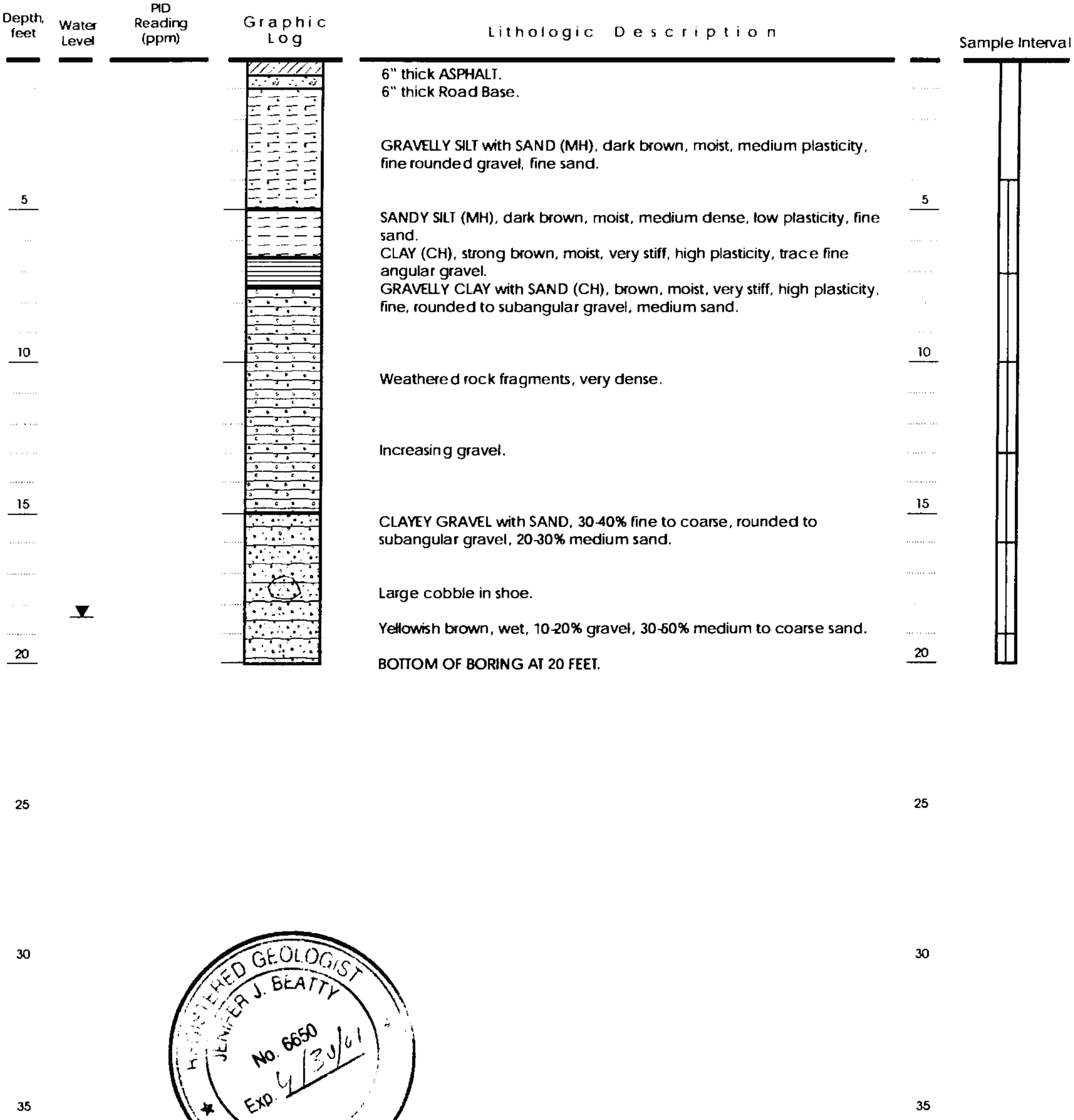
LITHOLOGY FOR 422-BH-04 *(page 1 of 1)*

Project No. 6730.00-024

SCVWD PILOT STUDY



Lithologic Description

6" thick ASPHALT.
6" thick Road Base.

GRAVELLY SILT with SAND (MH), dark brown, moist, medium plasticity, fine rounded gravel, fine sand.

SANDY SILT (MH), dark brown, moist, medium dense, low plasticity, fine sand.
CLAY (CH), strong brown, moist, very stiff, high plasticity, trace fine angular gravel.
GRAVELLY CLAY with SAND (CH), brown, moist, very stiff, high plasticity, fine, rounded to subangular gravel, medium sand.

Weathered rock fragments, very dense.

Increasing gravel.

CLAYEY GRAVEL with SAND, 30-40% fine to coarse, rounded to subangular gravel, 20-30% medium sand.

Large cobble in shoe.

Yellowish brown, wet, 10-20% gravel, 30-60% medium to coarse sand.

BOTTOM OF BORING AT 20 FEET.

REGISTERED GEOLOGIST JENNIFER J. BEATTY No. 6650 Exp. 4/30/01

Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: March 22, 1999
LFR Geologist: Rodney Crother, R.G., CH.G.

EXPLANATION

▤ Clay
▤ Silt
▨ Sand
▨ Gravel

PID - Photoionization Detector

▼ Water level at time of drilling

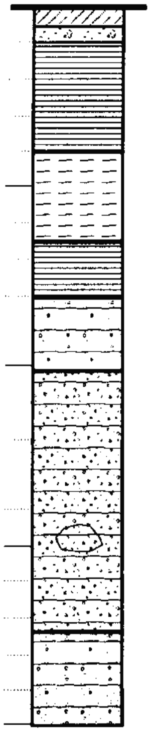
LFR LEVINE•FRICKE

LITHOLOGY FOR 422-BH-03 *(page 1 of 1)*

Project No. 6730.00-024

SCVWD PILOT STUDY

Depth, feet | Water Level | PID Reading (ppm) | Graphic Log | Lithologic Description | Sample Interval



6" thick ASPHALT.
6" thick Road Base.

CLAY (CH), very dark brown, moist, high plasticity, trace fine gravel.

SILT (ML), dark brown, moist, loose, low plasticity.

CLAY (CH), brown, moist, stiff, high plasticity.

CLAYEY SAND with GRAVEL (SC), dark yellowish brown, moist, very dense, high plasticity fines, medium sand, fine gravel.

CLAYEY GRAVEL with SAND (GC), dark yellowish brown, moist, very dense, fine rounded to subangular gravel and weathered rock fragments.

Increasing sand, coarse gravel.

Cobble.

▼ CLAYEY SAND with GRAVEL (SC), yellowish brown, wet, very dense, medium sand, fine rounded gravel.

BOTTOM OF BORING AT 20 FEET.

25

30

35

J. BEATTY
No. 6650
4/30/01

EXPLANATION

- ▤ Clay
- ▭ Silt
- ⬚ Sand
- ▨ Gravel

PID - Photoionization Detector

▼ Water level at time of drilling

Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: March 23, 1999
LFR Geologist: Rodney Crother, R.G., CH.G.

SANTA CLARA VALLEY WATER DISTRICT
Pilot Study of Operating Underground Storage Tanks
Santa Clara County, California

Site Report

SITE NUMBER 437

United States Postal Service
1750 Lundy Avenue
San Jose, California 95101

April 30, 1999

This Site Report is one of a series of reports prepared for the Santa Clara Valley Water District's Pilot Study of Operating Underground Storage Tanks. The District funded this study to assess if MtBE is being released from UST systems that meet 1998 federal- and state-mandated upgrade requirements. The District will use the results of the Pilot Study, and possibly information obtained during subsequent investigations, to evaluate whether up-graded UST systems that handle MtBE are protective of groundwater quality, and ultimately drinking water. This Study and other District groundwater vulnerability assessments are critical in formulating a plan to protect drinking water supplies into the future.

With cooperation from the site owner and operator and the assistance of the San Jose Fire Department, LFR Levine·Fricke completed a file review, site inspection, and soil-gas, soil, and groundwater sampling at this site on behalf of the District. LFR's subcontractor, Integrated Engineering Services, completed a UST inspection at this site. This report provides a brief summary of investigation findings, and site-specific data in tables, figures, and appendices. This Site Report is appended to the Summary Report for the Study.

LFR
LEVINE·FRICKE
1900 Powell Street, 12th Floor
Emeryville, California 94608-1827
(510) 652-4500/Fax (510) 652-2246

SUMMARY OF FINDINGS

SITE DESCRIPTION

Figure 1 illustrates the site location. Site geology consists primarily of silts and clays to approximately 70 feet below the ground surface (bgs). Sands and gravels were encountered in some of the boring locations from just beneath the surface to approximately 3 to 8 feet bgs, and again at approximately 45 to 50 feet bgs. The shallowest depth to groundwater measured during drilling was approximately 10 feet bgs.

SYSTEM DESCRIPTION

There are three 2,000-gallon double-walled oil USTs, two 12,000-gallon double-walled diesel USTs, and one 12,000-gallon double-walled gasoline UST at this site. All of the USTs are constructed of steel with fiberglass reinforced plastic exterior corrosion protection and double-walled fiberglass piping. The UST system utilizes continuous interstitial monitoring for both piping and UST leak detection.

RESULTS

MtBE was not detected in soil-gas or soil samples collected at this site. MtBE was detected in 2 of 7 groundwater samples collected at concentrations of 8.1 μg/l and 19 μg/l. Xylenes were detected in 4 of 9 soil-gas samples collected at concentrations ranging from 1.4 μg/l to 6.3 μg/l.TPH as gasoline was detected in one soil sample at a concentration of 13 mg/kg.

SITE SELECTION CRITERIA MET

1998 upgrade compliant?	Yes
On SCVWD fuel leak database?	No
Status:	Not applicable
Distance from LUST site:	Greater than 250 feet
Distance to water supply well:	Less than 2000 feet
Access granted?	Yes
SCVWD approved?	Yes

FILE REVIEW SUMMARY

Number of tanks:	6
Reported release?	No
Release date:	Not applicable
Fuel released:	Not applicable
Location:	Not applicable
Quantity (gallons):	Not applicable
Data available:	Not applicable
Comments:	

SITE VISIT - UST SYSTEM INFORMATION

Precision tank tightness records available? No

SITE VISIT - UST SYSTEM INFORMATION

Precision tank tightness records available?	No
Date of last test:	Not applicable
Method of tank testing:	Not applicable
Tank leak rate (gallons/hour):	Not applicable
UST overfill prevention system present?	Yes
Type of system:	Both overfill limiter and drop tube/check-valve
Automatic shut-off?	Yes
System operational?	Yes
Overfill containment (gallons):	15
Drop tube equipped with striker plate?	Yes
Under island containment present?	Yes
Under island containment monitoring:	None
Quick release dispenser hoses?	Yes
Alarm system functional?	Yes
Type:	Shut-off
Vents:	
Vent type:	Dedicated
Vent piping:	Double contained
Condition of UST turbine sump:	Good
Condition of UST flex line sump:	Good
Vapor recovery system:	Vapor assisted
Years of operation since upgrade:	Approximately 11 years
Years of operation as fueling facility:	Approximately 11 years
Estimated throughput:	Less than 100,000 gallons per month
Monitoring systems operational?	Yes
Systems operations, comment:	Veederroot TLS 350
Tank annular space monitoring:	Liquid probe
Overfill containment monitoring system:	Liquid probe
Piping leak detection:	Liquid probe
Is system monitored?	Yes
Station inventory records available?	Yes
Records up to date?	Yes
Records complete?	Yes
Supplier log reviewed?	Yes
Spill log reviewed?	Yes
Spill log comments:	None noted
Personnel training:	Yes

Comments:

Monitoring system functional test monthly.

SITE INSPECTION

Condition of apron around pumps:	Good
Evidence of recent paving/regrading?	No
Location of recent paving/regrading:	Not applicable
Description of surface drainage?	To southeast
Direct route for surface spills to subsurface?	No
Description of route to subsurface:	Not applicable
Other potential petroleum sources?	Yes
Description of other petroleum sources:	Service/maintenance building
Nearby surface water?	No
Name of surface water:	Not applicable
Type of surface water:	Not applicable

Comments:

Maintenance shop manager would be able to help coordinate on-site activities.

UST SYSTEM DATA FROM FORM B COLLECTED DURING FILE REVIEWS - TANK ID # Oil 1

Date installed:	1/1/87
Tank capacity (gallons):	2,000
Tank contents:	Oil
Tank construction:	
Type of system:	Double wall
Tank material (primary tank):	Bare steel
Lining compatible with 100% methanol:	No
Exterior corrosion protection:	Fiberglass reinforced plastic
Date spill containment installed:	1994
Date overfill protection equipment installed:	1994
Drop tube:	Yes
Striker plate:	Yes
Dispenser containment:	No
Piping information:	
System type:	Pressure, aboveground; Pressure, underground
Construction:	Single wall, aboveground; Double wall, underground
Material and corrosion protection:	Bare steel, aboveground Fiberglass pipe, underground
Leak detection:	Continuous interstitial monitoring
Tank leak detection?	Continuous interstitial monitoring

UST SYSTEM DATA FROM FORM B COLLECTED DURING FILE REVIEWS - TANK ID # Oil 2

Date installed:	1/1/87
Tank capacity (gallons):	2,000
Tank contents:	Oil
Tank construction:	
Type of system:	Double wall
Tank material (primary tank):	Bare steel
Lining compatible with 100% methanol:	No
Exterior corrosion protection:	Fiberglass reinforced plastic
Date spill containment installed:	1994
Date overfill protection equipment installed:	1994
Drop tube:	Yes
Striker plate:	Yes
Dispenser containment:	No
Piping information:	
System type:	Pressure, aboveground; Pressure, underground
Construction:	Single wall, aboveground; Double wall, underground
Material and corrosion protection:	Bare steel, aboveground Fiberglass pipe, underground
Leak detection:	Continuous interstitial monitoring
Tank leak detection?	Continuous interstitial monitoring

UST SYSTEM DATA FROM FORM B COLLECTED DURING FILE REVIEWS - TANK ID # Tank 5

Date installed:	1/1/87
Tank capacity (gallons):	12,000
Tank contents:	Regular unleaded
Tank construction:	
Type of system:	Double wall
Tank material (primary tank):	Bare steel
Lining compatible with 100% methanol:	No
Exterior corrosion protection:	Fiberglass reinforced plastic
Date spill containment installed:	1994
Date overfill protection equipment installed:	1994
Drop tube:	Yes
Striker plate:	Yes
Dispenser containment:	Yes
Piping information:	
System type:	Suction, underground
Construction:	Double wall, underground

Material and corrosion protection:	Fiberglass pipe, underground
Leak detection:	Continuous interstitial monitoring
Tank leak detection?	Continuous interstitial monitoring

UST SYSTEM DATA FROM FORM B COLLECTED DURING FILE REVIEWS - TANK ID # Tank 6

Date installed:	1/1/87
Tank capacity (gallons):	12,000
Tank contents:	Diesel
Tank construction:	
Type of system:	Double wall
Tank material (primary tank):	Bare steel
Lining compatible with 100% methanol:	No
Exterior corrosion protection:	Fiberglass reinforced plastic
Date spill containment installed:	1994
Date overfill protection equipment installed:	1994
Drop tube:	Yes
Striker plate:	Yes
Dispenser containment:	Yes
Piping information:	
System type:	Suction, underground
Construction:	Double wall, underground
Material and corrosion protection:	Fiberglass pipe, underground
Leak detection:	Continuous interstitial monitoring
Tank leak detection?	

UST SYSTEM DATA FROM FORM B COLLECTED DURING FILE REVIEWS - TANK ID # Tank 7

Date installed:	1/1/87
Tank capacity (gallons):	12,000
Tank contents:	Diesel
Tank construction:	
Type of system:	Double wall
Tank material (primary tank):	Bare steel
Lining compatible with 100% methanol:	No
Exterior corrosion protection:	Fiberglass reinforced plastic
Date spill containment installed:	1994
Date overfill protection equipment installed:	1994
Drop tube:	Yes
Striker plate:	Yes
Dispenser containment:	Yes
Piping information:	
System type:	Suction, underground

Construction:	Double wall, underground
Material and corrosion protection:	Fiberglass pipe, underground
Leak detection:	Continuous interstitial monitoring
Tank leak detection?	Continuous interstitial monitoring

UST SYSTEM DATA FROM FORM B COLLECTED DURING FILE REVIEWS - TANK ID # Waste Oil

Date installed:	1/1/87
Tank capacity (gallons):	2,000
Tank contents:	Oil
Tank construction:	
Type of system:	Double wall
Tank material (primary tank):	Bare steel
Lining compatible with 100% methanol:	No
Exterior corrosion protection:	Fiberglass reinforced plastic
Date spill containment installed:	1994
Date overfill protection equipment installed:	1994
Drop tube:	Yes
Striker plate:	Yes
Dispenser containment:	No
Piping information:	
System type:	Gravity, underground
Construction:	Double wall, underground
Material and corrosion protection:	Fiberglass pipe, underground
Leak detection:	Continuous interstitial monitoring
Tank leak detection?	Continuous interstitial monitoring

Table 1
Summary of Chemical Analysis Results for Soil-Gas Samples - Site #437
Santa Clara Valley Water District

Location	Date Sampled	Depth (ft bgs)	Methyl Tertiary Butyl Ether (MTBE) ug/L	TPH as Gasoline (TPHg) ug/L	Benzene (B) ug/L	Toluene (T) ug/L	Ethyl Benzene (E) ug/L	meta/para-Xylenes (m/p-X) ug/L	ortho-Xylene (o-X) ug/L	Notes
437-SG-01	01/14/99	8	<5	<100	<1	<1	<1	3.2	<1	
437-SG-02	01/14/99	8	<5	<100	<1	<1	<1	1.4	<1	
		15	<5	<100	<1	<1	<1	2.3	<1	
437-SG-03	01/14/99	8	<5	100	<1	<1	<1	<1	<1	
437-SG-04	01/14/99	8	<5	<100	<1	<1	<1	<1	<1	
437-SG-04-DUP		8	<5	<100	<1	<1	<1	<1	<1	
437-SG-05	01/14/99	8	<5	<100	<1	<1	<1	<1	<1	
		15	<5	<100	<1	<1	<1	<1	6.3	
437-SG-06	01/14/99	8	<5	<100	<1	<1	<1	<1	<1	

Table proofed by CLC.

Notes:

All primary and field duplicate (-DUP) samples were analyzed on site by InterPhase, of Los Angeles, CA using EPA Method 8020 for MTBE and BTEX, and Modified EPA Method 8015 for TPHg.

Additional field duplicate samples (-SPL) were analyzed off site by Air Toxics, Ltd., Folsom, CA using EPA Method TO-14.

ft bgs = feet below ground surface
NA = Not analyzed
TPH = total petroleum hydrocarbons
ug/L = micrograms per liter

Data Qualifiers (if shown on table):

E = Exceeds the calibration range
I = Interference by the sample matrix
J = Estimated value
UJ = Not detected at the estimated reporting limit shown

T[illegible]e 2
Summary of Chemical Analysis Results for Soil Samples - Site #437
Santa Clara Valley Water District

Location	Date Sampled	Depth (ft bgs)	Methyl Tertiary Butyl Ether (MTBE) ug/Kg	TPH as Gasoline (TPHg) mg/Kg	Benzene (B) ug/Kg	Toluene (T) ug/Kg	Ethyl Benzene (E) ug/Kg	meta/para-Xylenes (m/p-X) ug/Kg	ortho-Xylene (o-X) ug/Kg	Di-isopropyl Ether (DIPE) ug/Kg	Ethyl Tertiary Butyl Ether (ETBE) ug/Kg	Tertiary Amyl Methyl Ether (TAME) ug/Kg	Tertiary Butyl Alcohol (TBA) ug/Kg
437-BH-01	01/20/99	5.5-6.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		10.5-11.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
437-BH-02	01/20/99	10.0-10.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		14.5-15.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
437-BH-03	01/20/99	10.5-11.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		15.0-15.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
437-BH-04	01/21/99	6.0-6.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		10.5-11.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
437-BH-05	01/21/99	6.0-6.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		12.0-12.5	<5	13	<5	<5	<5	<5	<5	<20	<20	<20	<200
437-BH-06	01/21/99	5.0-5.5	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200
		13.5-14.0	<5	<1	<5	<5	<5	<5	<5	<20	<20	<20	<200

Table proofed by CLC.

Notes:

All samples were analyzed by Alpha Analytical, Inc. of Sparks, NV, using EPA Method 8260 for MTBE, BTEX, DIPE, ETBE, TAME, and TBA, and Modified EPA Method 8015 for TPHg.

ft bgs = feet below ground surface
mg/Kg = milligrams per kilogram
TPH = total petroleum hydrocarbons
ug/Kg = micrograms per kilogram

Data Qualifiers (if shown on table):

J = Estimated value
UJ =Not detected at the estimated reporting limit shown

Table 3
Summary of Chemical Analysis Results for Groundwater Samples - Site # 437
Santa Clara Valley Water District

Location	Date Sampled	Depth (ft bgs)	Methyl Tertiary Butyl Ether (MTBE) ug/L	TPH as Gasoline (TPHg) mg/L	Benzene (B) ug/L	Toluene (T) ug/L	Ethyl Benzene (E) ug/L	meta/para-Xylenes (m/p-X) ug/L	ortho-Xylene (o-X) ug/L	Di-isopropyl Ether (DIPE) ug/L	Ethyl Tertiary Butyl Ether (ETBE) ug/L	Tertiary Amyl Methyl Ether (TAME) ug/L	Tertiary Butyl Alcohol (TBA) ug/L
437-BH-01	01/20/99	25.0	<0.5	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<10
437-BH-02	01/20/99	28.0	<0.5	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<10
437-BH-03	01/20/99	25.0	<0.5	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<10
437-BH-03-DUP		25.0	<0.5	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<10
437-BH-04	01/21/99	25.0	<0.5	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<10
437-BH-05	01/21/99	25.0	19	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<10
437-BH-06	01/21/99	31.0	8.1	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<10

Table proofed by CLC.

Notes:

All primary and field duplicate (-DUP) samples were analyzed by Alpha Analytical, Inc. of Sparks, NV, using EPA Method 8260 for MTBE, BTEX, DIPE, ETBE, TAME, and TBA, and Modified EPA Method 8015 for TPHg.

ft bgs = feet below ground surface
mg/L = milligrams per liter
TPH = total petroleum hydrocarbons
ug/L = micrograms per liter

Data Qualifiers (if shown on table):

J = Estimated value
UJ =Not detected at the estimated reporting limit shown

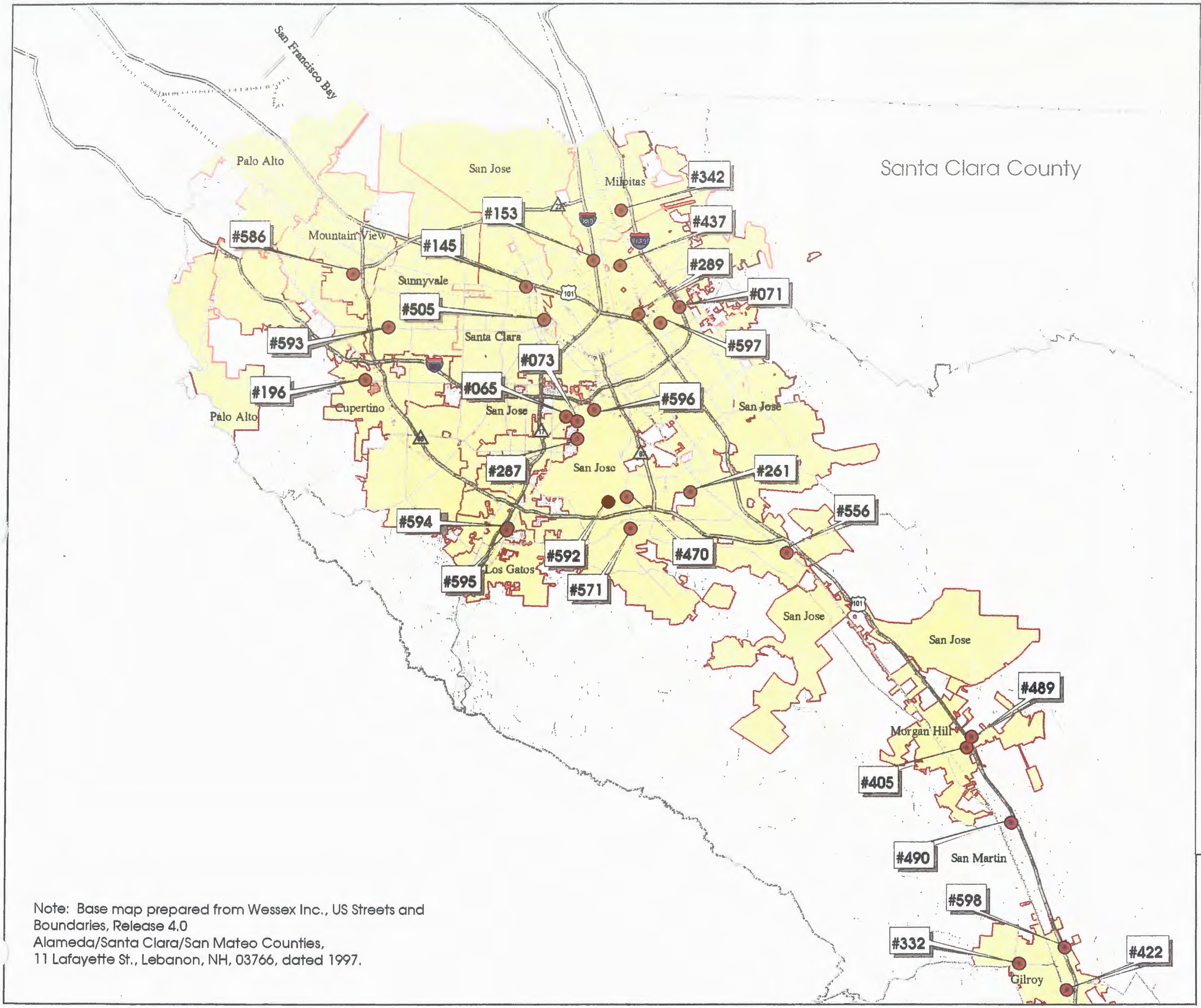
Table 4
Summary of Physical Parameters for Soil Samples - Site #437
Santa Clara Valley Water District

Location	Depth (ft bgs)	Visual Description	Total Organic Carbon (percent)	Moisture Content (percent)	Wet Weight (lbs/cu.ft.)	Dry Unit Weight (lbs/cu.ft.)	Porosity (percent)
437-BH-01	13.5 - 14.0	Brown fine sandy clay	0.28	26.18	118.5	93.9	44.25
437-BH-03	14.5 - 15.0	Brown fine sandy clay	0.21	25.69	121.6	96.8	42.53
437-BH-04	11.5 - 12.0	Brown fine sandy clay	0.20	25.84	121.4	96.5	42.70
437-BH-05	24.5 - 25.0	Brown fine sandy clay with gravel	0.21	19.34	140.3	117.6	30.18

Table proofed by CLC.

Notes:

Specific gravity values were 2.70 for all samples analyzed.
Total organic carbon analyses were performed by Curtis and Tompkins Analytical Laboratories, Berkeley, CA.
All other analyses were performed by URS Greiner Woodward Clyde, Oakland, CA.
ft bgs = feet below ground surface
lbs/cu.ft. = pounds per cubic foot
NA = Not analyzed



Note: Base map prepared from Wessex Inc., US Streets and Boundaries, Release 4.0
Alameda/Santa Clara/San Mateo Counties,
11 Lafayette St., Lebanon, NH, 03766, dated 1997.

Legend

● Site Location
🟨 City within Santa Clara County
Santa Clara County Boundary
Rivers, Creeks, and Streams
Freeway
Principal Arterials
Local Streets and Roads
Railroad Lines

3 0 3 Miles

Santa Clara Valley Water District
Pilot Study Sites

Santa Clara Valley Water District

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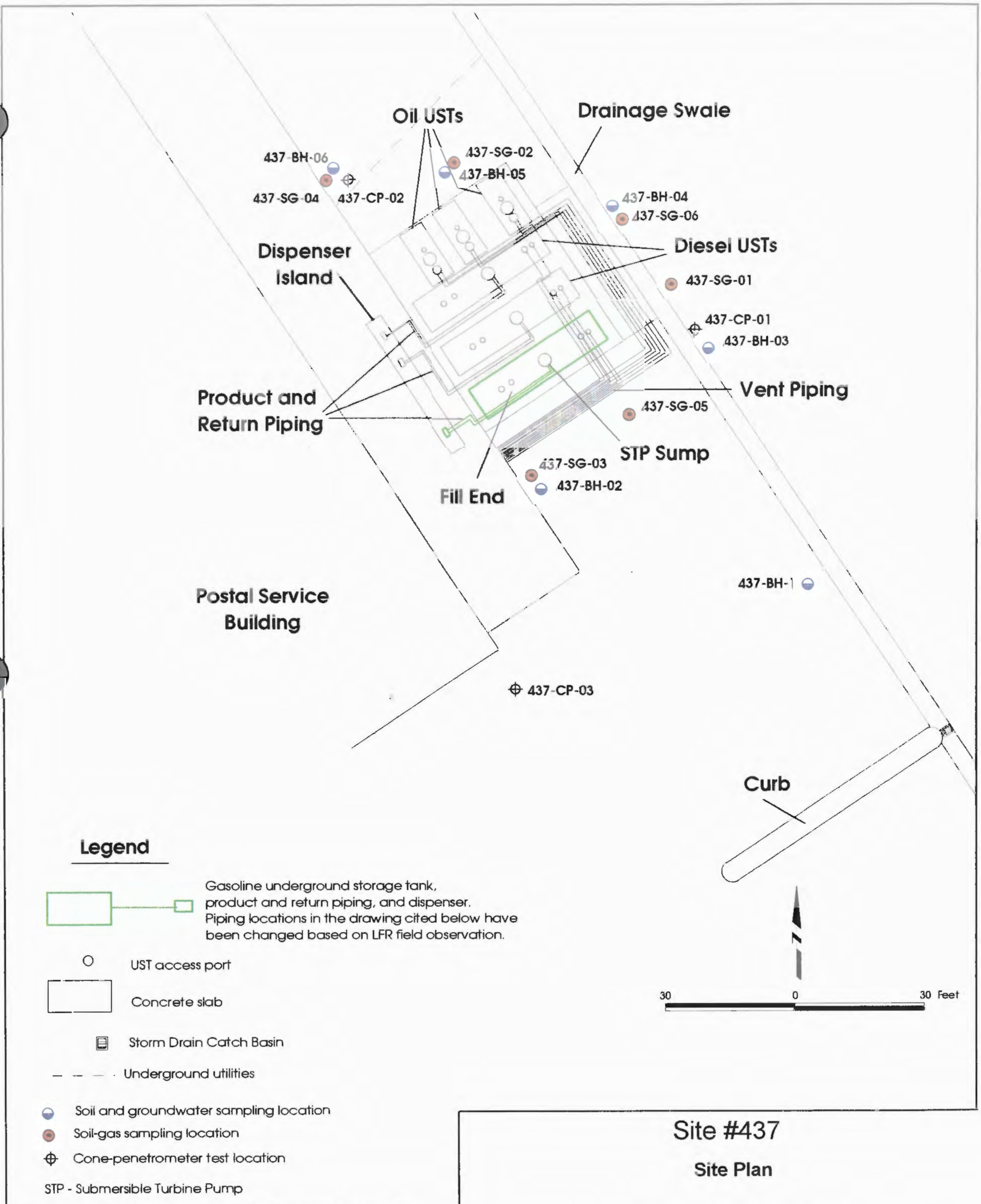
Figure 1



Note: Base map prepared from a site plan provided by the U.S. Postal Service (name and date of site plan unknown). Adjustments to UST and piping locations were made based on LFR Levine Fricke field measurements of UST access ports on 2/10/99. UST and piping locations are approximate.

Site #437

Site Plan

Santa Clara Valley Water District

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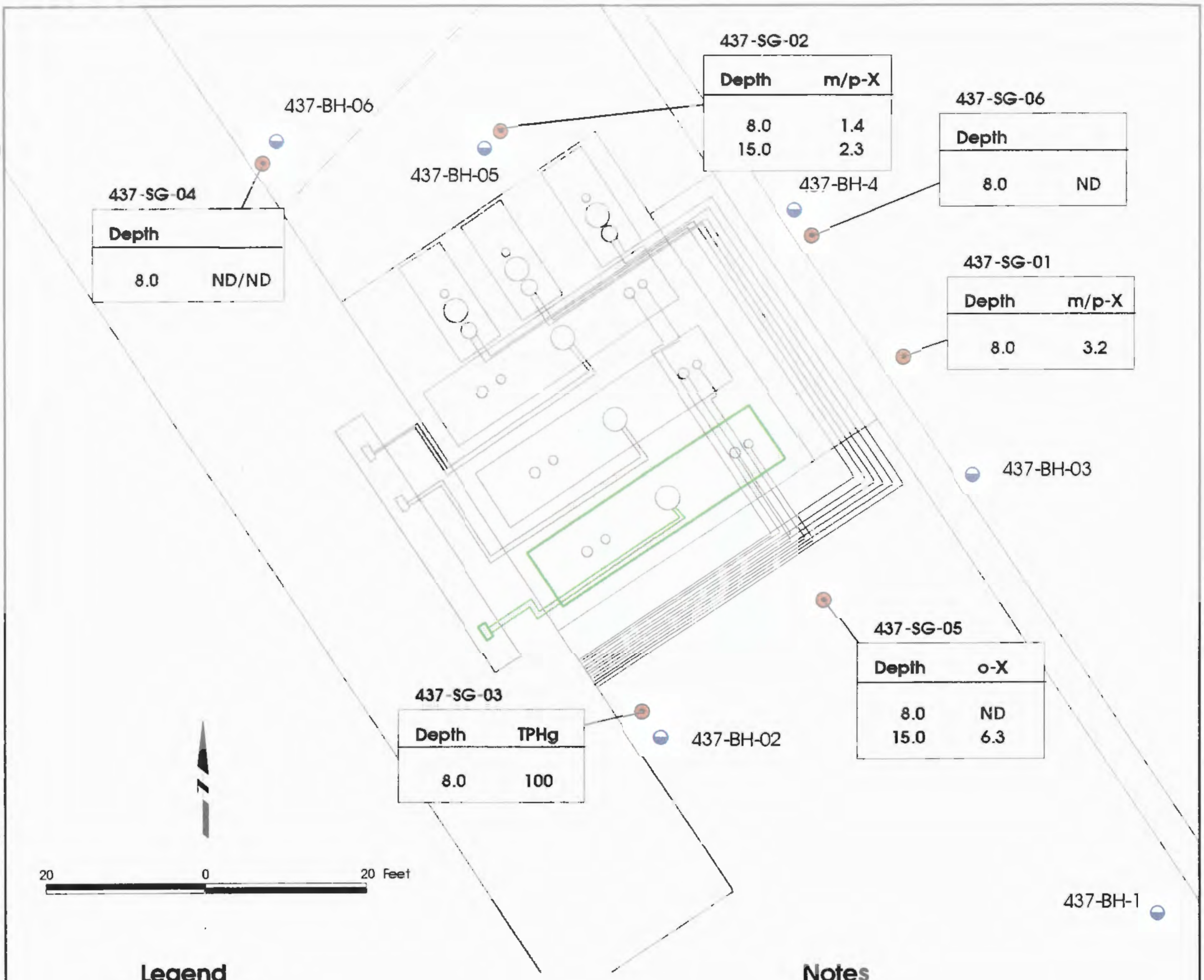
Figure 2



Legend

● Soil-gas sampling location

◒ Soil and groundwater sampling location

The following represents a hypothetical sampling point and defines the characters associated with that point:

Sample Location — ###-SG-01

Depth	m/p-X	T
5.0 12.0	2.5 1.0/1.2	4.1 ND/ND

Depth in feet

Result of primary analysis

Result of duplicate analysis when applicable

🟩 Gasoline underground storage tank, product and return piping, and dispenser

○ UST access port

☐ Concrete slab

— — — Underground utilities

See Figure 2 for description of site features and origin of base map.

Notes

Concentrations of analytes detected are presented; analytes not detected are not presented or are presented as ND (not detected). MTBE and BTEX were analyzed using EPA Method 8020 and TPHg was analyzed suing Modified EPA Method 8015.

Results in micrograms/liter (ug/L)
RL = Reporting Limit

Each sample was analyzed for the following:

MTBE = Methyl Tertiary Butyl Ether (RL = 5 ug/L)
TPHg = Total Petroleum Hydrocarbons as Gasoline (RL = 100 ug/L)
B = Benzene (RL = 1 ug/L)
T = Toluene (RL = 1 ug/L)
E = Ethyl Benzene (RL = 1 ug/L)
m/p-X = meta/para-Xylenes (RL = 1 ug/L)
o-X = ortho-Xylene (RL = 1 ug/L)

Site #437

Summary of Chemical Analysis Results for Soil-Gas Samples

Santa Clara Valley Water District

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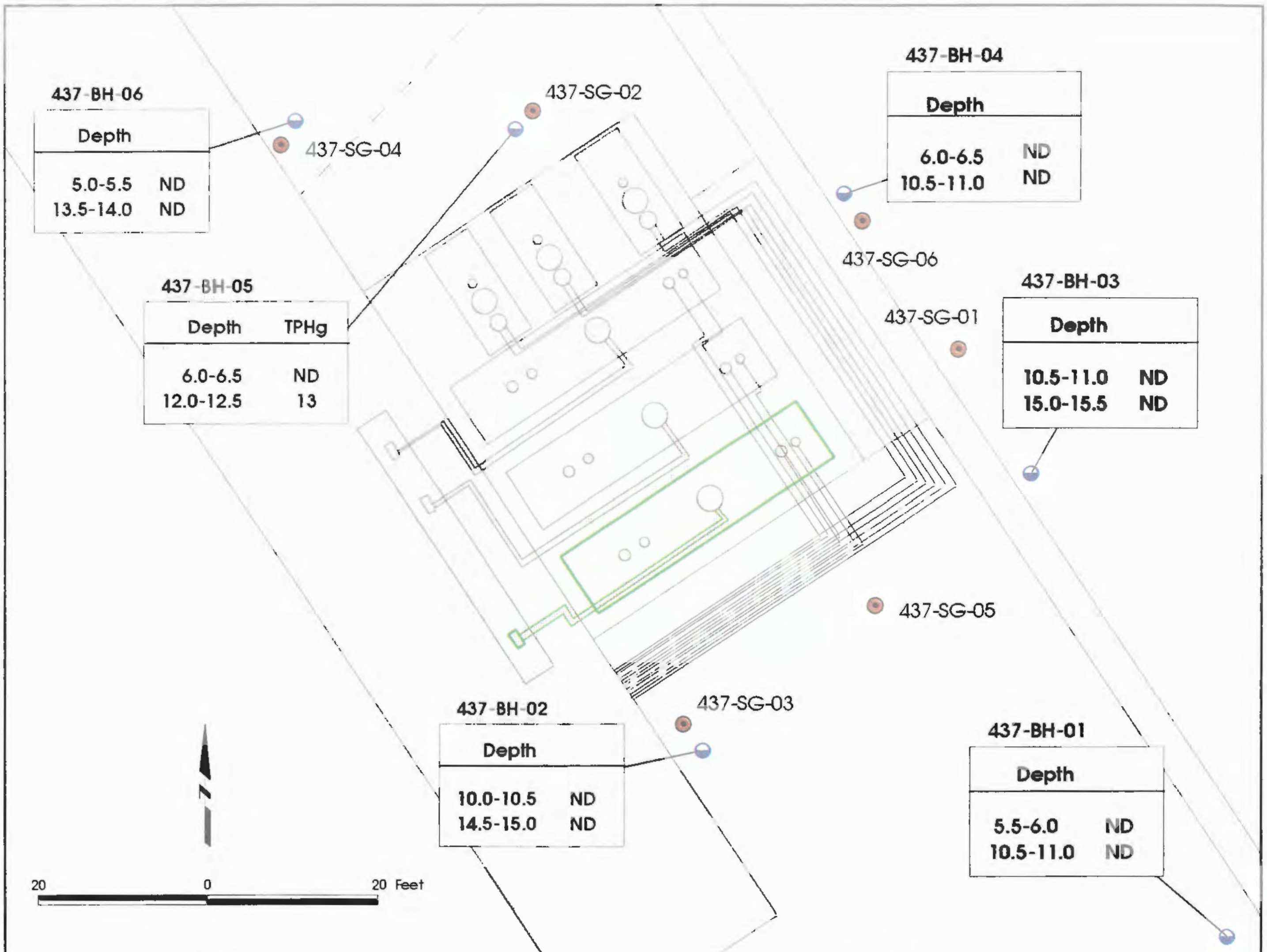
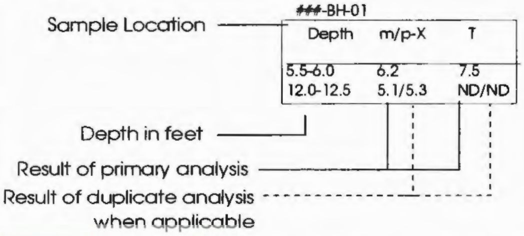
Figure 3



Legend

● Soil and groundwater sampling location
● Soil-gas sampling location

The following represents a hypothetical sampling point and defines the characters associated with that point:



▭ Gasoline underground storage tank, product and return piping, and dispenser
○ UST access port
▭ Concrete slab
— — — Underground utilities

See Figure 2 for description of site features and origin of base map.

Notes

Concentrations of analytes detected are presented; analytes not detected are not presented or are presented as ND (not detected). TPHg was analyzed using Modified EPA Method 8015, all other analytes were analyzed using EPA Method 8260.

Results in micrograms/kilogram (ug/Kg) for all compounds except TPHg which is presented in milligrams/kilogram (mg/Kg).

RL = Reporting Limit

Each sample was analyzed for the following:

MTBE = Methyl Tertiary Butyl Ether (RL = 5 ug/Kg)
TPHg = Total Petroleum Hydrocarbons as Gasoline (RL = 1 mg/Kg)
B = Benzene (RL = 5 ug/Kg)
T = Toluene (RL = 5 ug/Kg)
E = Ethyl Benzene (RL = 5 ug/Kg)
m/p-X = meta/para-Xylenes (RL = 5 ug/Kg)
o-X = ortho-Xylene (RL = 5 ug/Kg)
DIPE = Di-isopropyl Ether (RL = 20 ug/Kg)
ETBE = Ethyl Tertiary Butyl Ether (RL = 20 ug/Kg)
TAME = Tertiary Amyl Methyl Ether (RL = 20 ug/Kg)
TBA = Tertiary Butyl Alcohol (RL = 200 ug/Kg)

Site #437

Summary of Chemical Analysis Results for Soil Samples

Santa Clara Valley Water District

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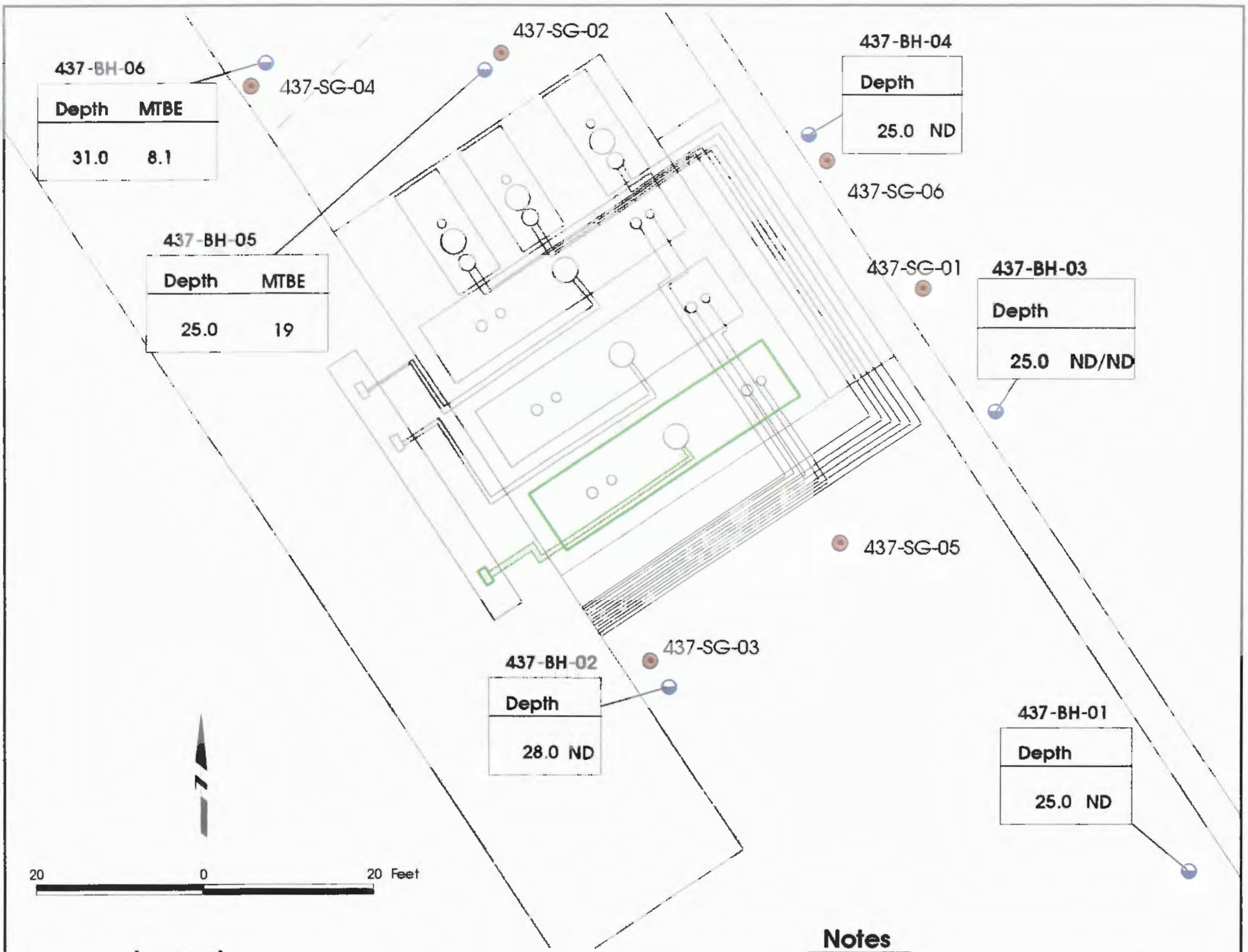
Figure 4



Legend

- ◒ Soil and groundwater sampling location
- ● Soil-gas sampling location

The following represents a hypothetical sampling point and defines the characters associated with that point:

Sample Location — ###-BH-01

Depth	m/p-X	T
5.5-6.0	6.2	7.5
12.0-12.5	5.1/5.3	ND/ND

Depth in feet

Result of primary analysis

Result of duplicate analysis when applicable

🟩 Gasoline underground storage tank, product and return piping, and dispenser

○ UST access port

▭ Concrete slab

— — — · Underground utilities

See Figure 2 for description of site features and origin of base map.

Notes

Concentrations of analytes detected are presented; analytes not detected are not presented or are presented as ND (not detected). TPHg was analyzed using Modified EPA Method 8015, all other analytes were analyzed using EPA Method 8260.

Results in micrograms/liter (ug/L) for all compounds except TPHg which is presented in milligrams/liter (mg/L).

RL = Reporting Limit

Each sample was analyzed for the following:

MTBE = Methyl Tertiary Butyl Ether (RL = 0.5 ug/L)
TPHg = Total Petroleum Hydrocarbons as Gasoline (RL = 0.05 mg/L)
B = Benzene (RL = 0.5 ug/L)
T = Toluene (RL = 0.5 ug/L)
E = Ethyl Benzene (RL = 0.5 ug/L)
m/p-X = meta/para-Xylenes (RL = 0.5 ug/L)
o-X = ortho-Xylene (RL = 0.5 ug/L)
DIPE = Di-isopropyl Ether (RL = 1 ug/L)
ETBE = Ethyl Tertiary Butyl Ether (RL = 1 ug/L)
TAME = Tertiary Amyl Methyl Ether (RL = 1 ug/L)
TBA = Tertiary Butyl Alcohol (RL = 10 ug/L)

Site #437

Summary of Chemical Analysis Results for Groundwater Samples

Santa Clara Valley Water District

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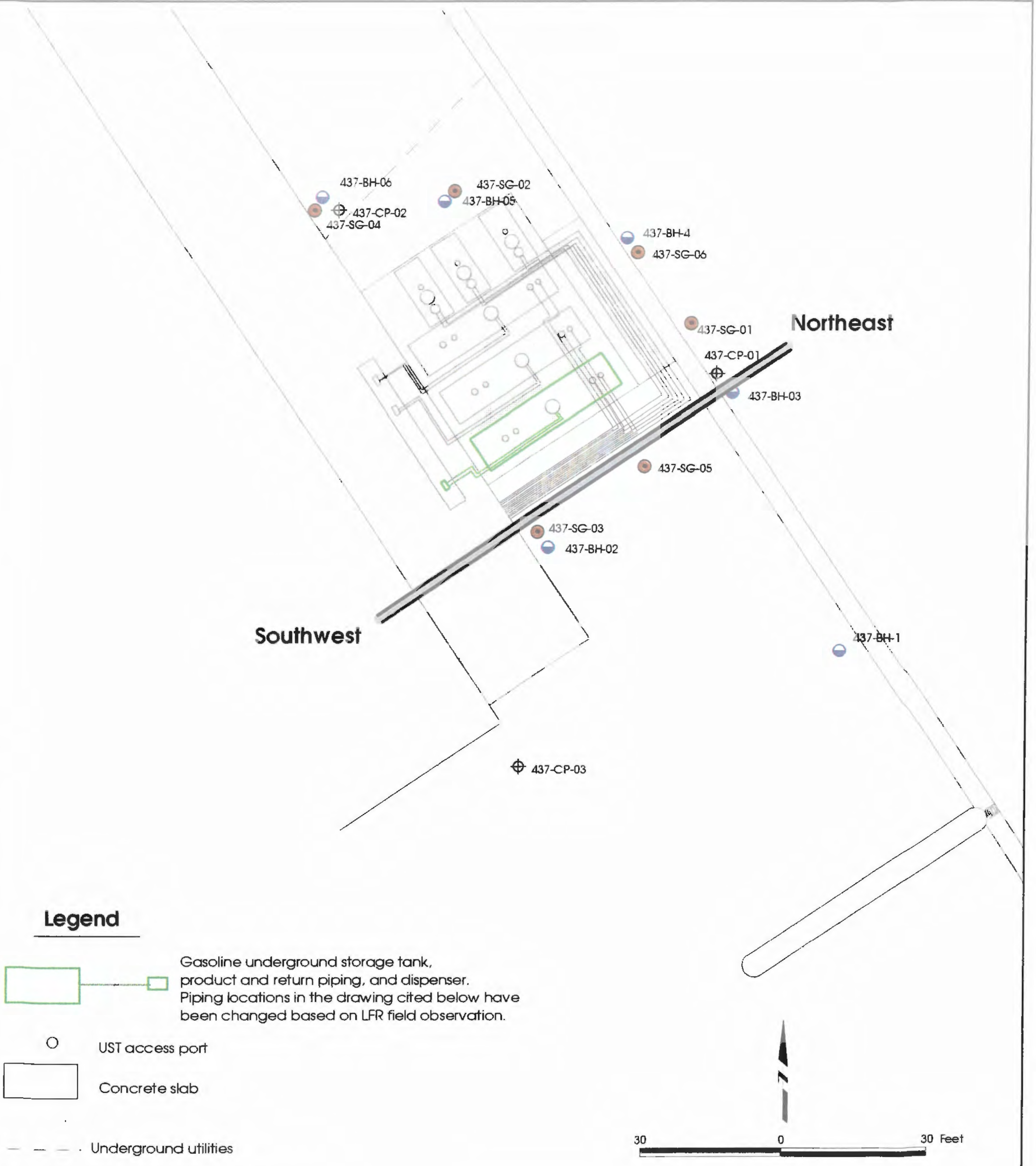
Figure 5



Legend

🟩 Gasoline underground storage tank, product and return piping, and dispenser. Piping locations in the drawing cited below have been changed based on LFR field observation.

○ UST access port

☐ Concrete slab

— — — Underground utilities

◒ Soil and groundwater sampling location

● Soil-gas sampling location

⊕ Cone-penetrometer test location

See Figure 2 for description of site features and origin of base map.

Site #437

Site Plan Showing Orientation of Vertical Profile

Santa Clara Valley Water District

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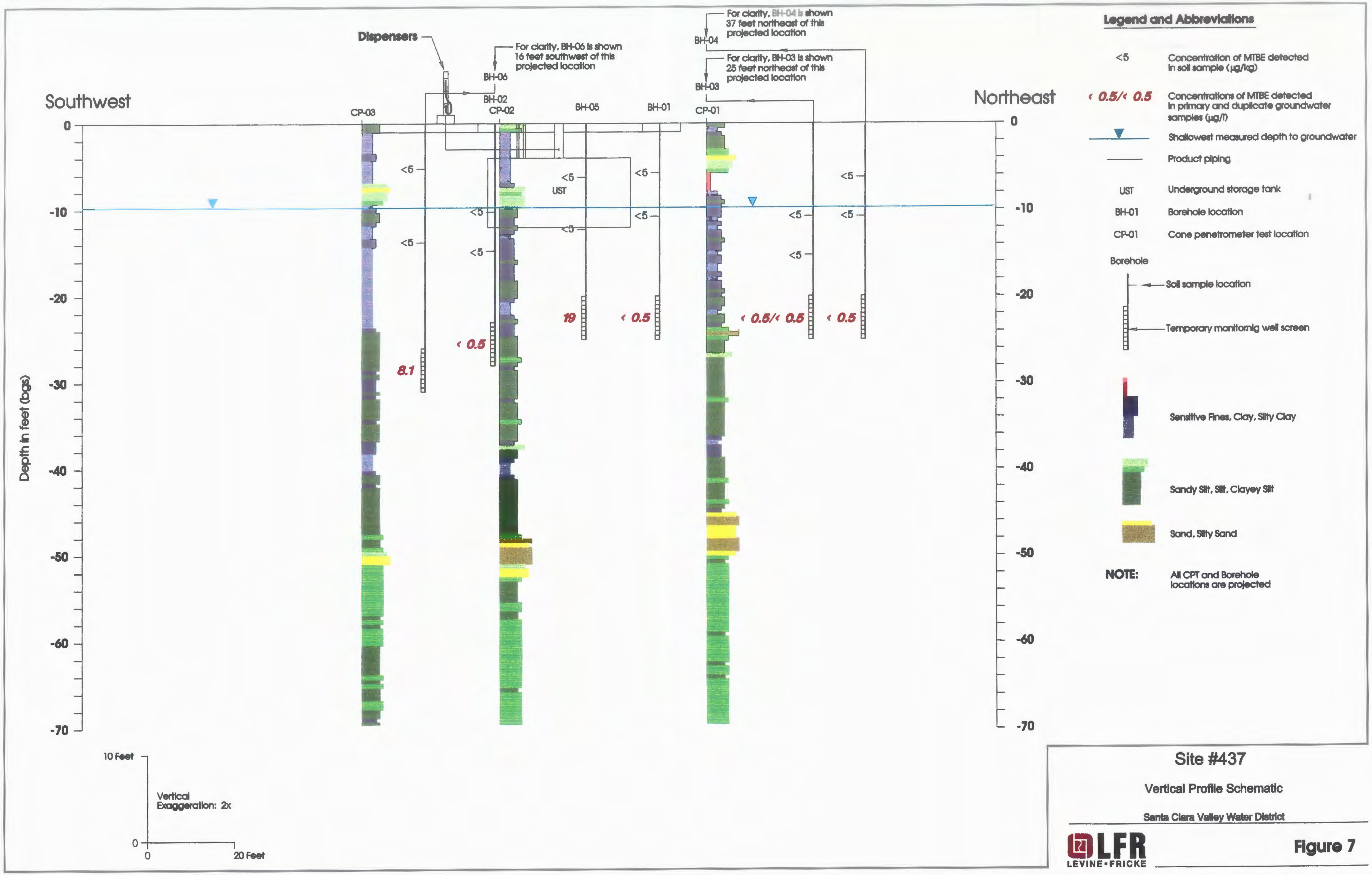
Figure 6


Dispensers
For clarity, BH-06 is shown 16 feet southwest of this projected location
For clarity, BH-04 is shown 37 feet northeast of this projected location
For clarity, BH-03 is shown 25 feet northeast of this projected location
BH-06
BH-04
BH-03
Southwest
Northeast
CP-03
BH-02
CP-02
BH-05
BH-01
CP-01
UST
<5
8.1
‹ 0.5
19
‹ 0.5
‹ 0.5/‹ 0.5
‹ 0.5
Depth in feet (bgs)
0
-10
-20
-30
-40
-50
-60
-70
10 Feet
0
0
20 Feet
Vertical Exaggeration: 2x
Legend and Abbreviations
<5
Concentration of MTBE detected in soil sample (µg/kg)
‹ 0.5/‹ 0.5
Concentrations of MTBE detected in primary and duplicate groundwater samples (µg/l)
Shallowest measured depth to groundwater
Product piping
UST
Underground storage tank
BH-01
Borehole location
CP-01
Cone penetrometer test location
Borehole
Soil sample location
Temporary monitoring well screen
Sensitive Fines, Clay, Silty Clay
Sandy Silt, Silt, Clayey Silt
Sand, Silty Sand
NOTE:
All CPT and Borehole locations are projected

J:\ENGCAD\6730\CM\#437.DWG 04/29/99 x-sec.PCP

Site #437

Vertical Profile Schematic

Santa Clara Valley Water District

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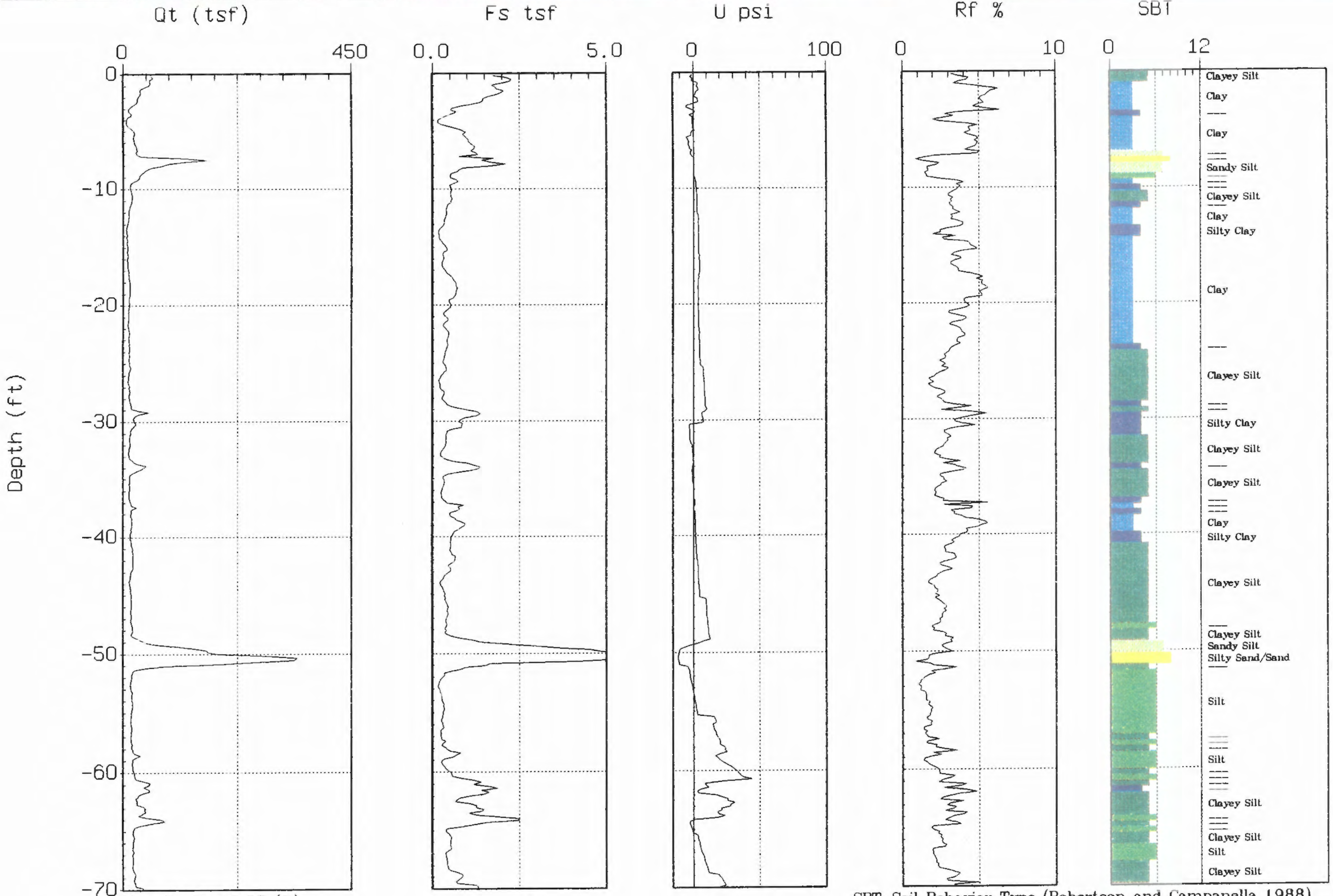
Figure 7

GREGG

LFR LEVINE.FRICKE

Site: 437 POST OFFICE
Location : 437-CP-03

Geologist: T. BENNETT
Date : 12:30:98 12:15



Max. Depth: 70.05 (ft)

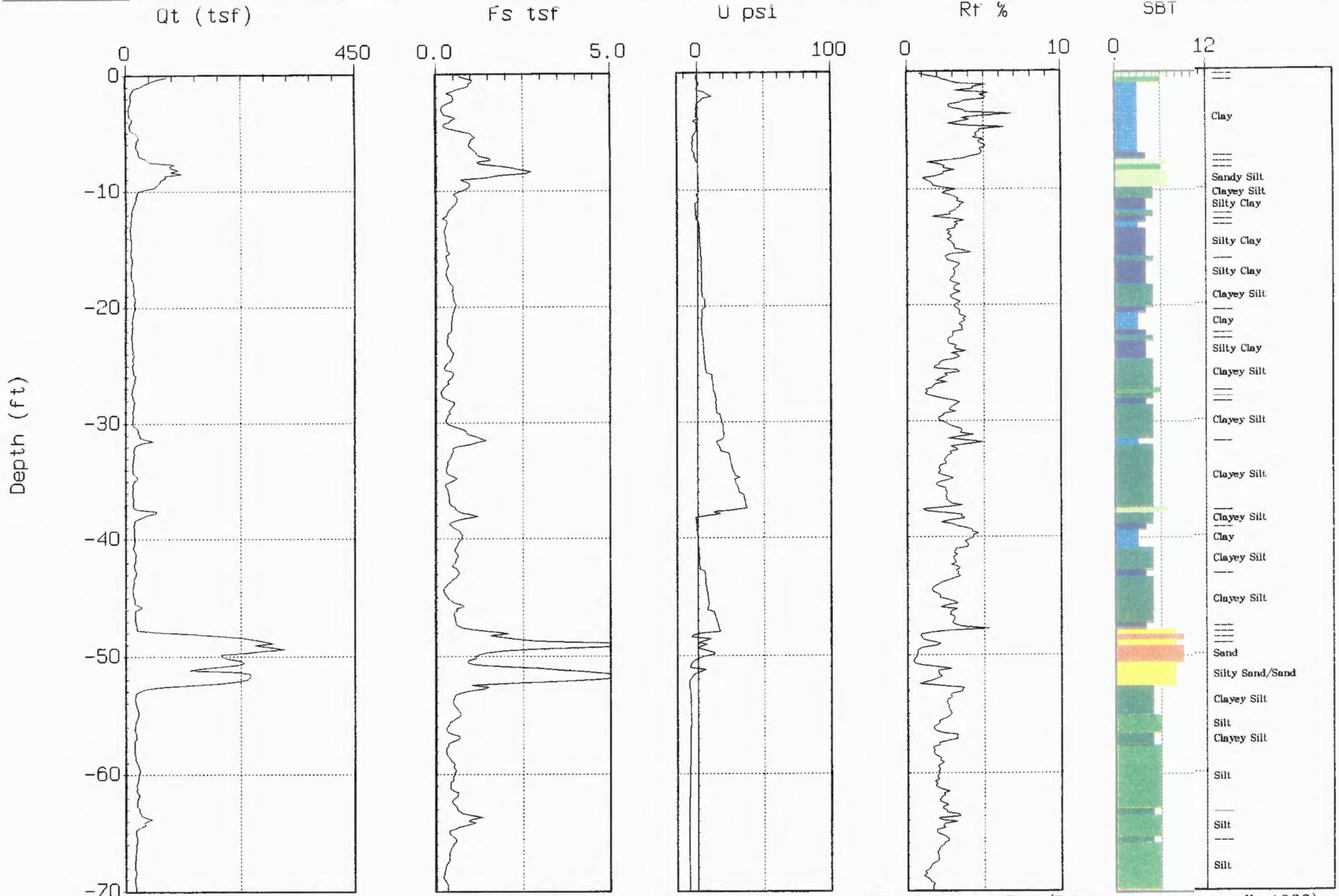
Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson and Campanella 1988)

LFR LEVINE.FRICKE

Site: 437 POST OFFICE
Location : 437-CP-02

Geologist: T. BENNETT
Date : 12:30:98 10:50



Max. Depth: 70.05 (ft)

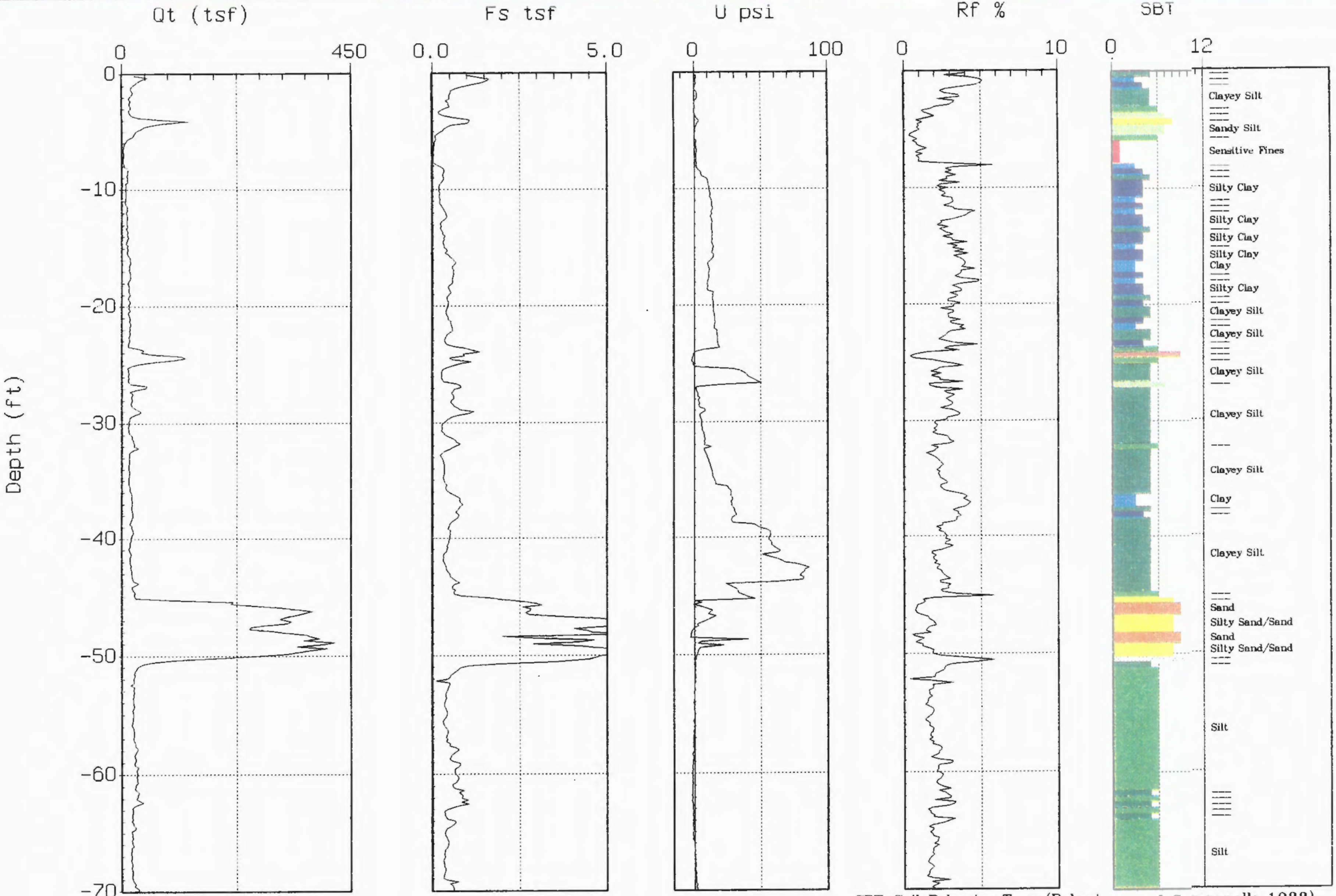
Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson and Campanella 1988)

LFR LEVINE.FRICKE

Site: 437 POST OFFICE
Location : 437-CP-01

Geologist: T. BENNETT
Date : 12:30:98 09:44



Max. Depth: 70.05 (ft)

Depth Inc.: 0.164 (ft)

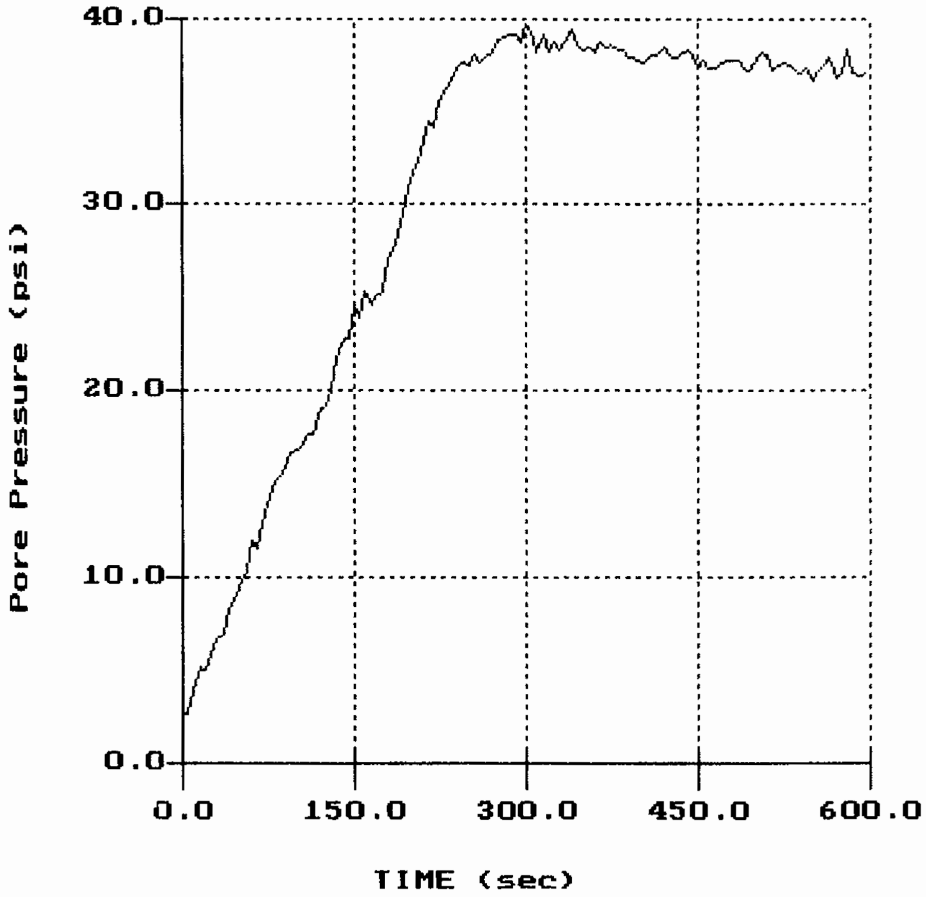
SBT: Soil Behavior Type (Robertson and Campanella 1988)

LFR LEVINE FRICKE

Hole:437-CP-01
Location:437 POST OFFICE

Cone:20 TON AD071
Date:12:30:98 09:4

PORE PRESSURE DISSIPATION RECORD



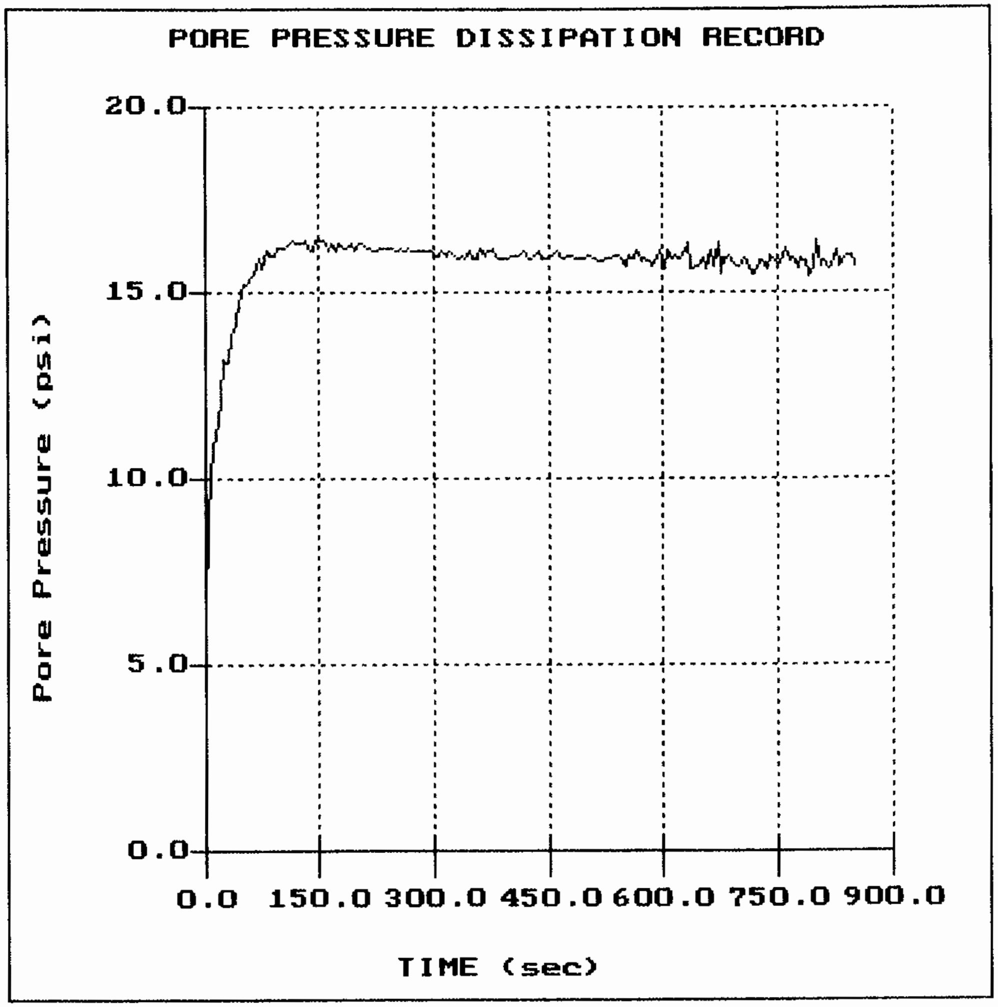
File: 14543701.PPR
Depth (m): 21.35
(ft): 70.05
Duration : 595.0s
U-min: 2.60 5.0s
U-max: 39.70 300.0s

LFR LEVINE FRICKE

Hole:437-CP-02
Location:437 POST OFFICE

Cone:20 TON AD071
Date:12:30:98 10:50

File: 14543702.PPR
Depth (m): 11.60
(ft): 38.06
Duration : 850.0s
U-min: 6.10 0.0s
U-max: 16.40 800.0s

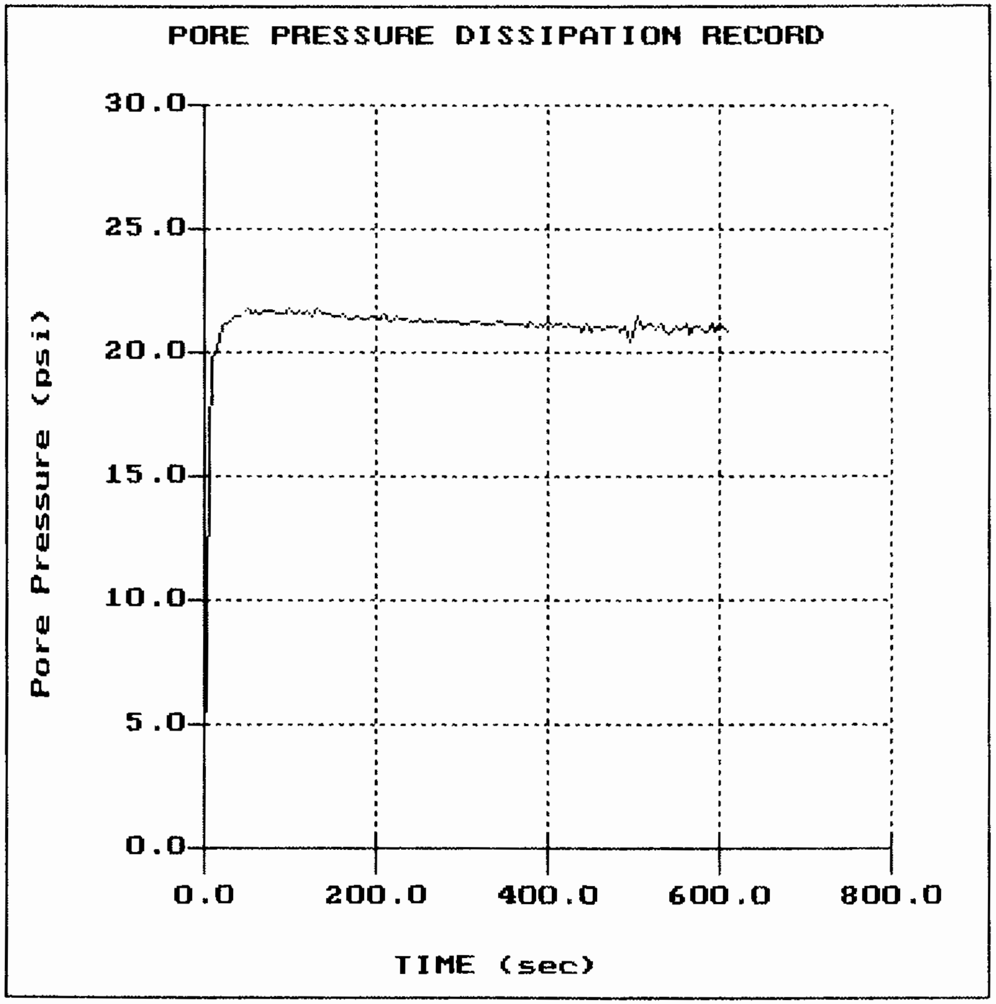


PORE PRESSURE DISSIPATION RECORD

LFR LEVINE FRICKE

Hole:437-CP-02
Location:437 POST OFFICE

Cone:20 TON AD071
Date:12:30:98 10:50


PORE PRESSURE DISSIPATION RECORD

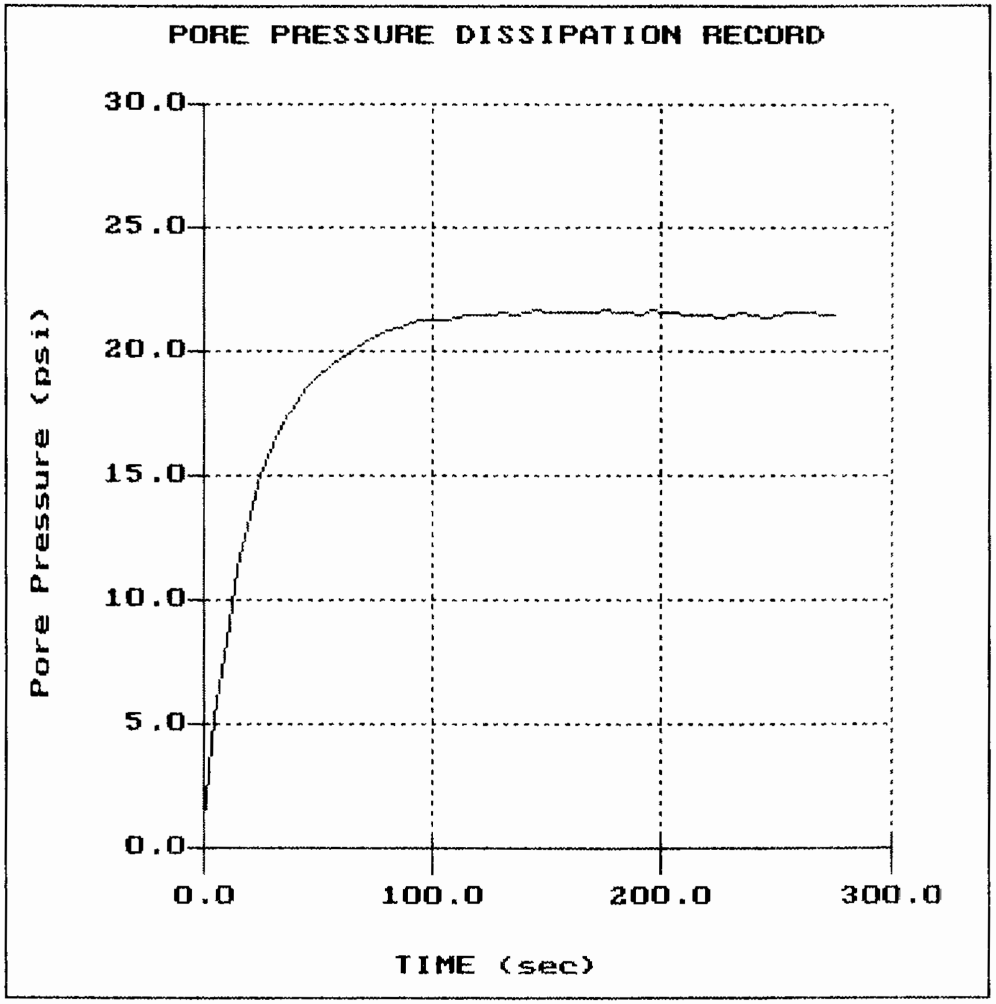
File: 14543702.PPR
Depth (m): 14.75
(ft): 48.39
Duration : 610.0s
U-min: 1.90 0.0s
U-max: 21.80 130.0s

LFR LEVINE FRICKE

Hole:437-CP-02
Location:437 POST OFFICE

Cone:20 TON AD071
Date:12:30:98 10:50

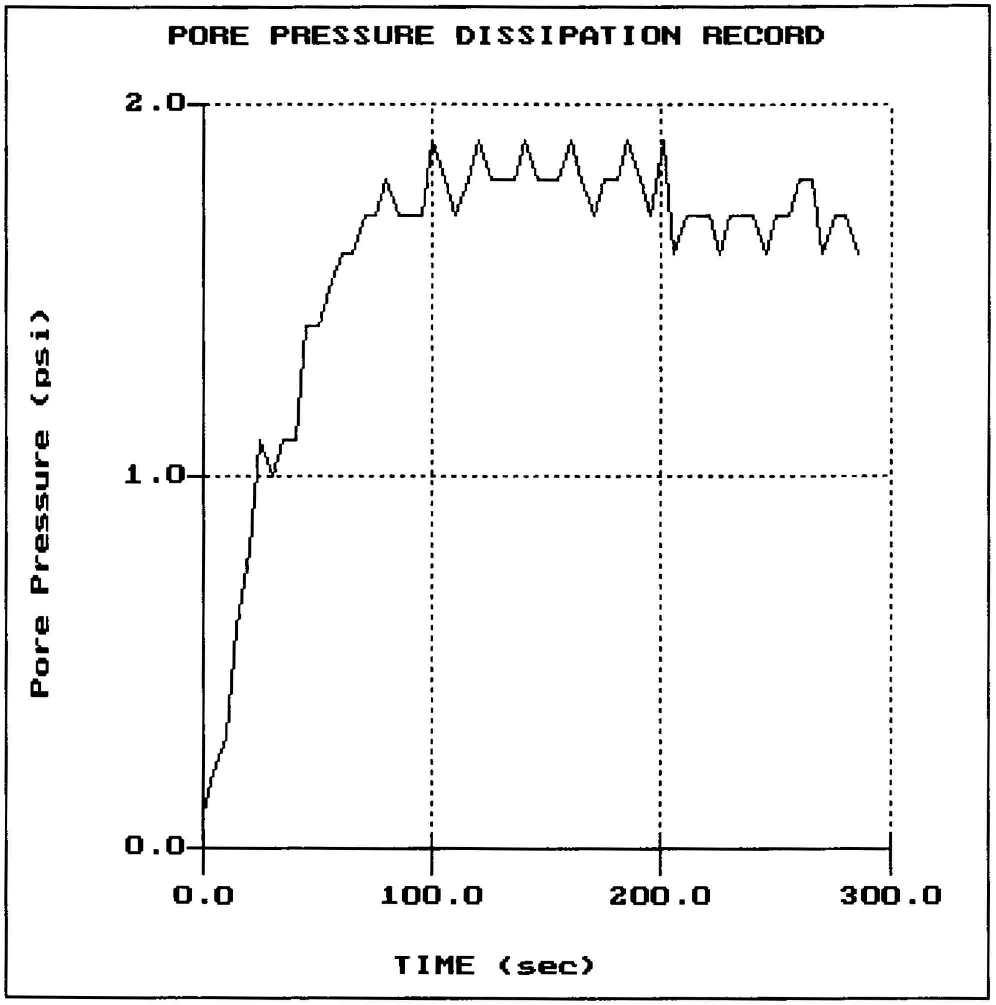
File: 14543702.PPR
Depth (m): 14.90
(ft): 48.88
Duration : 275.0s
U-min: 0.90 0.0s
U-max: 21.70 195.0s


PORE PRESSURE DISSIPATION RECORD

LFR LEVINE FRICKE

Hole:437-CP-03
Location:437 POST OFFICE

Cone:20 TON AD071
Date:12:30:98 12:15

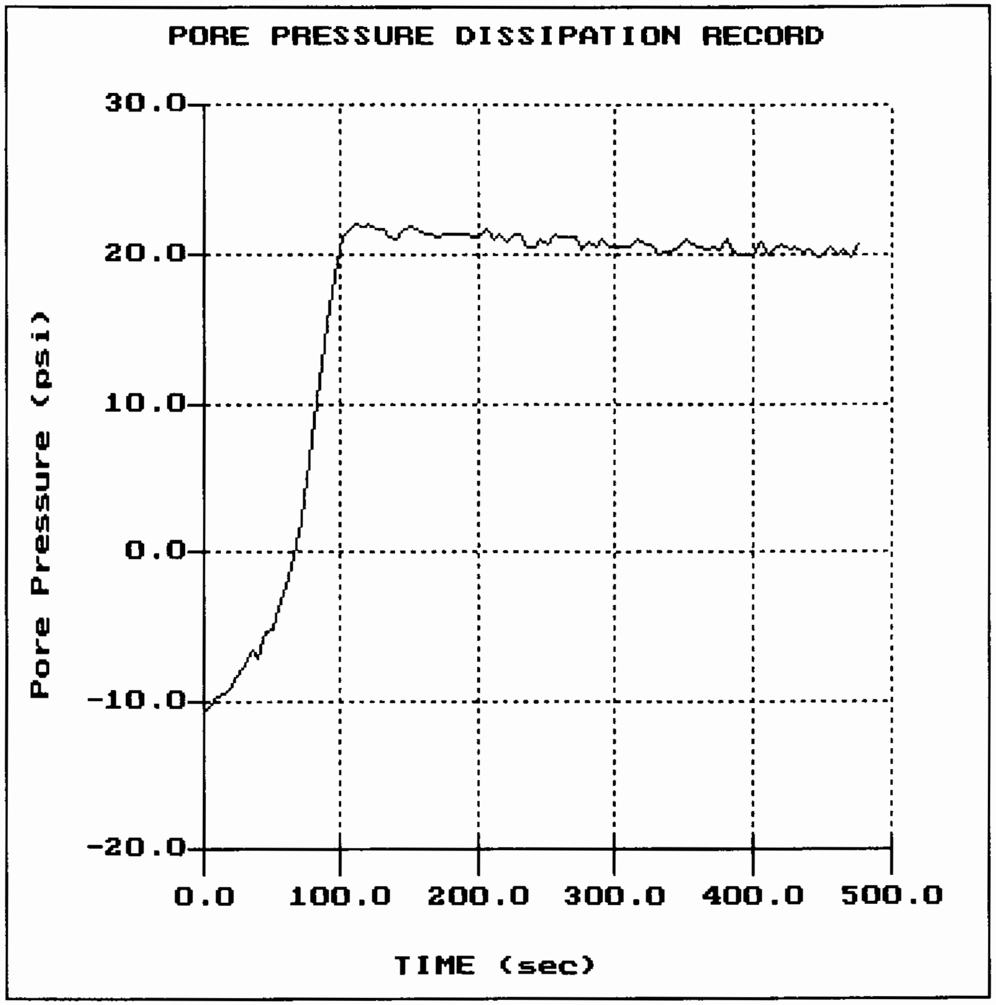


File: 14543703.PPR
Depth (m): 2.70
(ft): 8.86
Duration : 285.0s
U-min: 0.10 0.0s
U-max: 1.90 200.0s

LFR LEVINE FRICKE

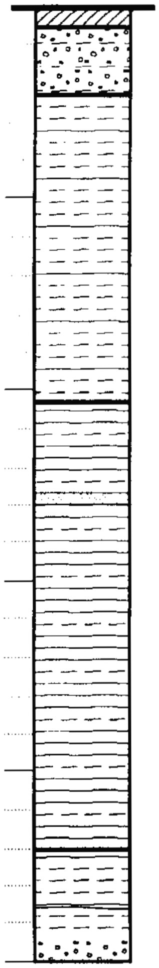
Hole:437-CP-03
Location:437 POST OFFICE

Cone:20 TON AD071
Date:12:30:98 12:15



File: 14543703.PPR
Depth (m): 15.55
(ft): 51.02
Duration : 475.0s
U-min: -10.80 0.0s
U-max: 22.10 120.0s

SCVWD PILOT STUDY



Depth, feet	Water Level	PID Reading (ppm)	Lithologic Description
			ASPHALT Pavement.
			SILTY GRAVEL (Fill?), yellowish brown to brown.
			CLAYEY SILT (ML), yellowish brown, slightly moist, medium stiff, low plasticity, moderately sandy. More sandy (fine sand).
		0.0	
5			
		0.0	
10		0.0	
			SILTY CLAY (CL), yellowish brown to brown, slightly moist, medium stiff, non-plasticity.
		0.0	Thin sandy interbed, very moist.
15			
		0.0	
		0.0	
20			
		0.0	
			CLAYEY SILT (ML), yellowish brown, moist, soft to medium stiff, slight plasticity, very sandy.
			SILTY GRAVEL (GM), wet. BOTTOM OF BORING AT 25 FEET.
25		0.0	
30			
35			

Sample Interval

REGISTERED GEOLOGIST
JENIFER J. BEATTY
No. 6650
Exp. 4/30/01
STATE OF CALIFORNIA

EXPLANATION

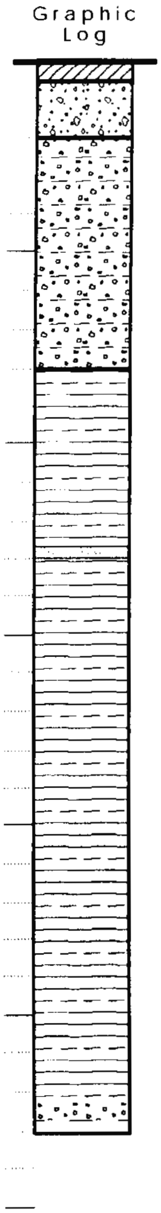
▤	Clay
▤	Silt
▨	Sand
▨	Gravel

PID - Photoionization Detector

▼ Water level at time of drilling

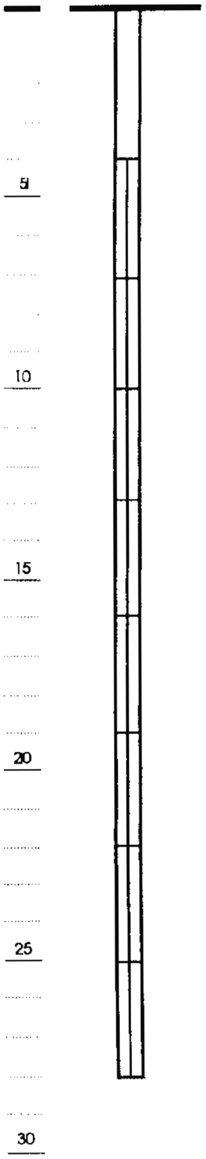
Drilling Method:	Dual-Tube/Direct Push
Drilling Company:	Precision
Date Well Drilled:	January 20, 1999
LFR Geologist:	Thomas Zakaria, R.G., CH.G.

SCVWD PILOT STUDY



Depth, feet	Water Level	PID Reading (ppm)	Lithologic Description
			ASPHALT Pavement.
			Engineered Fill?
			SILTY GRAVEL (GM), yellowish brown, dry, medium dense, gravel up to 1 inch diameter.
		0.0	
5			
		0.0	
			SILTY CLAY (CL), brown to dark brown, moist, medium stiff to stiff, medium to high plasticity.
10		0.0	
		0.0	Sandy silt interbed, moist, soft.
15			More brown, stiff, high plasticity.
		0.0	
		0.0	
20			Pale brown.
			Dark grayish brown.
		0.0	
25		0.0	
			SILTY CLAY (CL), yellowish brown, moist/wet, moderately sandy and gravelly.
		0.0	BOTTOM OF BORING AT 28 FEET.
30			
35			

Sample Interval



JENNIFER J. BEATTY
No. 6650
Exp. 4/30/01
STATE OF CALIFORNIA

Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: January 20, 1999
LFR Geologist: Thomas Zakaria, R.G., CH.G.

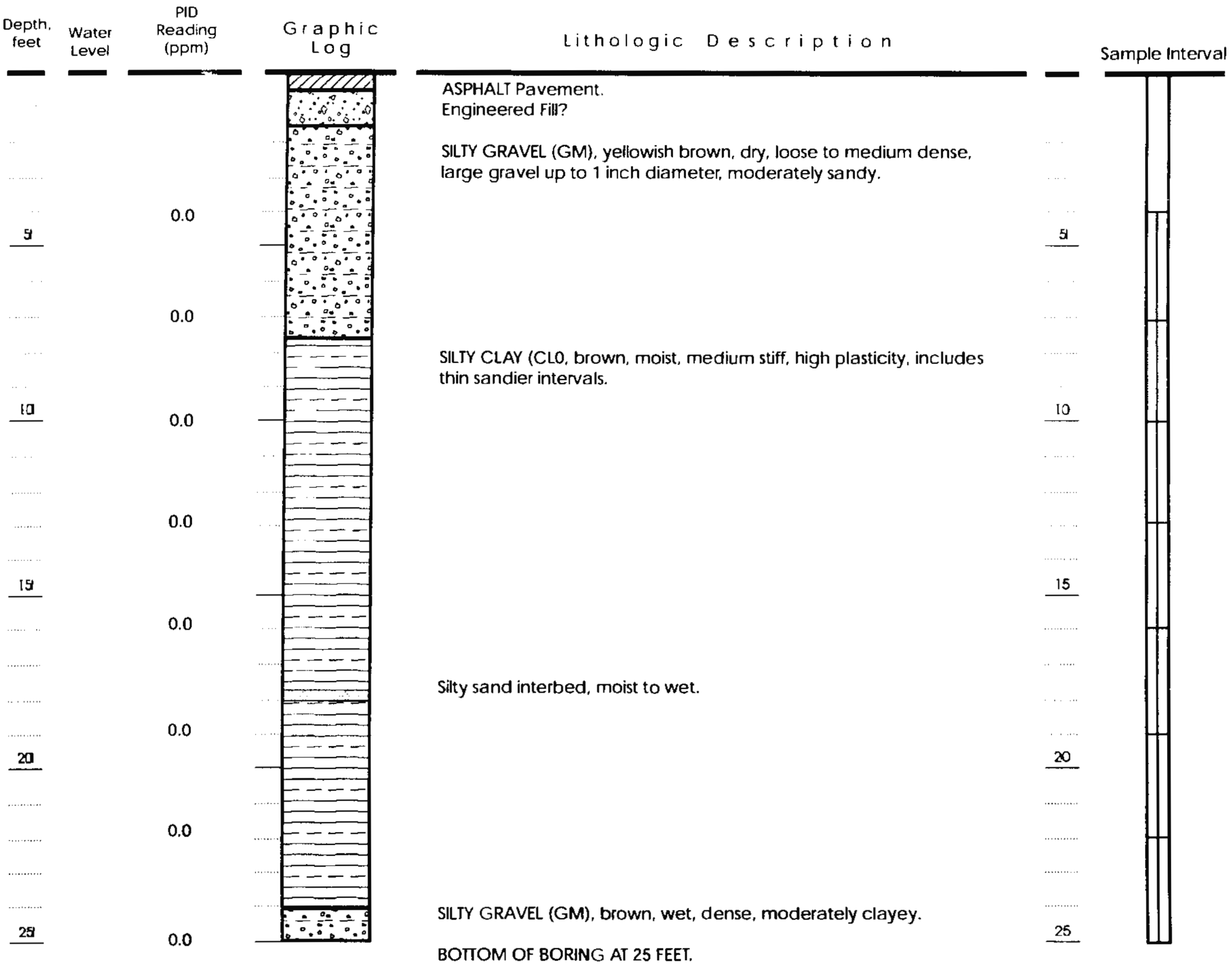
EXPLANATION

▤	Clay
▤	Silt
░	Sand
⁘	Gravel

PID - Photoionization Detector

▼ Water level at time of drilling

SCVWD PILOT STUDY



Depth, feet	Water Level	PID Reading (ppm)	Lithologic Description	Depth, feet	Sample Interval
			ASPHALT Pavement. Engineered Fill?		
			SILTY GRAVEL (GM), yellowish brown, dry, loose to medium dense, large gravel up to 1 inch diameter, moderately sandy.		
		0.0			
5				5	
		0.0			
			SILTY CLAY (CLO, brown, moist, medium stiff, high plasticity, includes thin sandier intervals.		
10		0.0		10	
		0.0			
15				15	
		0.0			
			Silty sand interbed, moist to wet.		
		0.0			
20				20	
		0.0			
			SILTY GRAVEL (GM), brown, wet, dense, moderately clayey.		
25		0.0		25	
			BOTTOM OF BORING AT 25 FEET.		
30				30	
35				35	

JENIFER J. BEATTY
No. 6650
Exp. 9/30/01
STATE OF CALIFORNIA

EXPLANATION

▤ Clay

▤ Silt

░ Sand

░ Gravel

PID - Photoionization Detector

▼ Water level at time of drilling

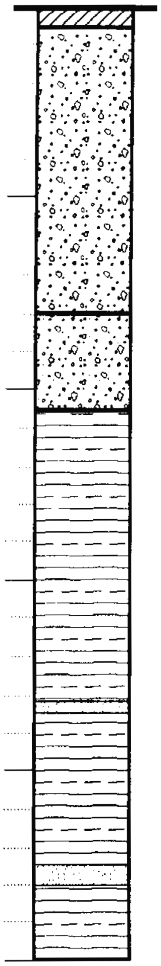
Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: January 20, 1999
LFR Geologist: Thomas Zakaria, R.G., CH.G.

LFR
LEVINE•FRICKE

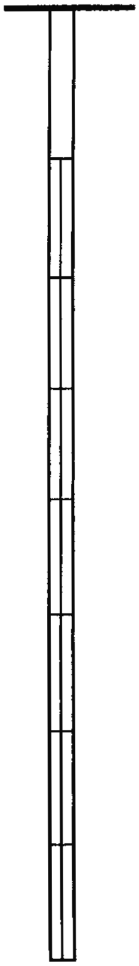
LITHOLOGY FOR 437-BH-03 *(page 1 of 1)*

Project No. 6730.00-024

SCVWD PILOT STUDY



Depth, feet	Water Level	PID Reading (ppm)	Lithologic Description
			ASPHALT Pavement.
			SANDY GRAVEL (GW), yellowish brown, dry to slightly moist, dense, very silty, gravels up to 1 inch diameter (subangular), moderately silty, minor clay.
		0.0	
5			
		0.0	
			SANDY GRAVEL, moist, finer than above.
10		0.0	
			SILTY CLAY (CL), brown, moist, soft to medium stiff, medium plasticity, occasionally some sand (fine sand).
			- less moist, more stiff and plasticity.
		0.0	
15			
		0.0	
			Thin sandy silt interbed, moist, soft.
		0.0	
20			
		0.0	
			Thin sandy silt interbed, moist, soft. Increasingly more silty and moist.
25		0.0	BOTTOM OF BORING AT 25 FEET.
30			
35			



JENIFER J. BEATTY
No. 6650
Exp. 4/30/01

Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: January 21, 1999
LFR Geologist: Thomas Zakaria, R.G., CH.G.

EXPLANATION

▤	Clay
▤	Silt
▨	Sand
▨	Gravel

PID - Photoionization Detector

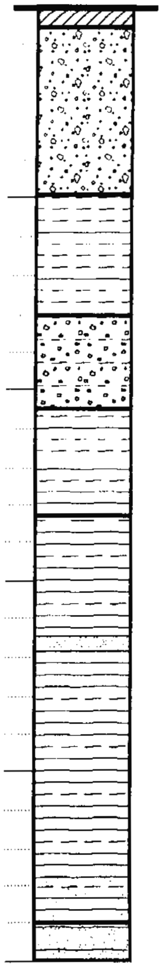
▼ Water level at time of drilling

LFR
LEVINE•FRICKE

LITHOLOGY FOR 437-BH-04 *(page 1 of 1)*

Project No. 6730.00-024

SCVWD PILOT STUDY



Depth, feet	Water Level	PID Reading (ppm)	Lithologic Description
			ASPHALT Pavement.
			SANDY GRAVEL (GW), yellowish brown, dense, moderately silty, gravels up to 1 inch diameter (poor recovery in sampler).
5			
			CLAYEY SILT (ML), grayish brown, slightly moist, medium stiff, non plasticity.
		0.3	
			SILTY GRAVEL (GM), (poor recovery in sampler).
10		1.2	
			CLAYEY SILT to SILTY CLAY (ML-CL), gray, moist, soft to medium stiff, medium plasticity.
		3.1	
			- bluish color.
		0.9	
			SILTY CLAY (CL), brown, moist, medium stiff, medium plasticity.
15			
		0.2	
			Sandy silt interbed, very moist, moderately clayey.
		0.0	
20			
			- more silty.
		0.0	
			Increasingly more sandy (medium to coarse sand).
			CLAYEY SAND (SC), moist to very moist.
25		0.0	
			BOTTOM OF BORING AT 25 FEET.
30			
35			

Sample Interval

No. 6650
Exp. 7/31/01
STATE OF CALIFORNIA

EXPLANATION

☰	Clay
☷	Silt
░	Sand
▨	Gravel

PID - Photoionization Detector

▼ Water level at time of drilling

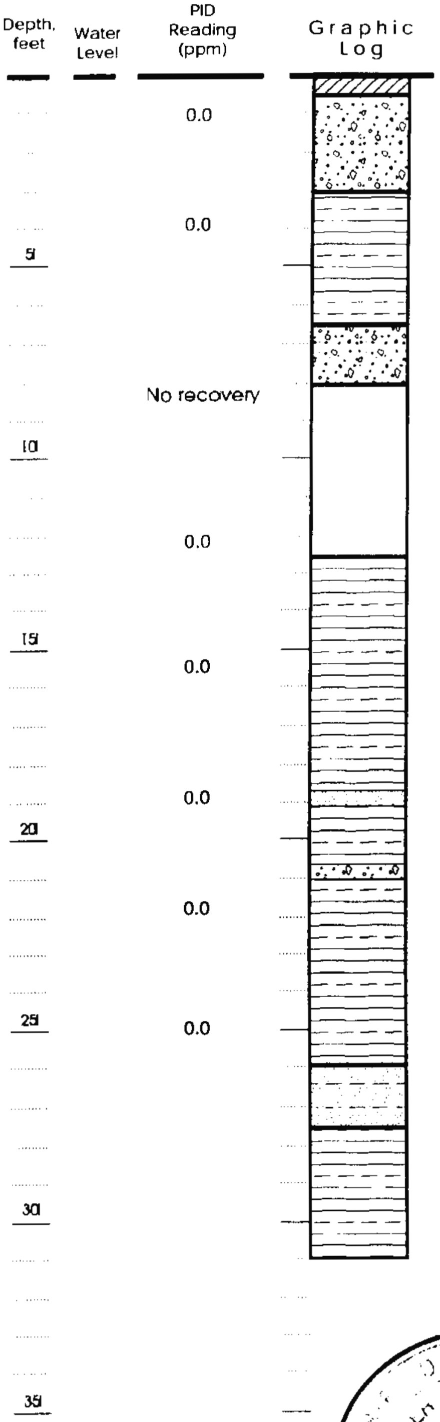
Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: January 21, 1999
LFR Geologist: Thomas Zakaria, R.G., CH.G.

LFR
LEVINE•FRICKE

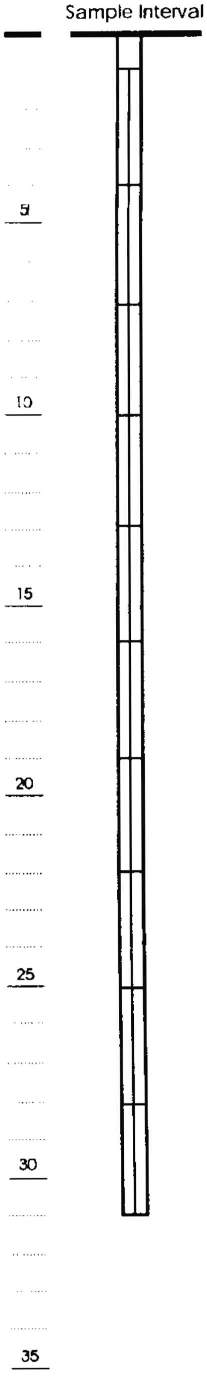
LITHOLOGY FOR 437-BH-05 *(page 1 of 1)*

Project No. 6730.00-024

SCVWD PILOT STUDY



PID Reading (ppm)	Lithologic Description
	ASPHALT Pavement.
0.0	SANDY GRAVEL (GW), yellowish brown, dry, loose.
0.0	SILTY CLAY (CL), dark brown, slightly moist, medium stiff, medium plasticity.
	Increasing silt. CLAYEY SILT (ML).
	SANDY GRAVEL (GW), yellowish brown, large pieces of gravel.
No recovery	Note: Soft push, likely into fine material, but no recovery, pieces of large gravel blocking sampler.
0.0	
	SILTY CLAY (CL), dark brown, moist, medium stiff to stiff, medium to high plasticity.
0.0	
0.0	Silty sand interbed.
	Imbedded gravel, moist.
0.0	
0.0	
	SILTY SAND (SM), brown, wet/saturated, medium to coarse sand, water start entering (dual tube).
	SILTY CLAY (CL), dark brown, moist, frequent sandy interbeds, water dual tube more than 2 feet.
	BOTTOM OF BORING AT 31 FEET.



JENNIFER J. BEATTY
No. 6650
Exp. 4/30/01

Drilling Method: Dual-Tube/Direct Push
Drilling Company: Precision
Date Well Drilled: January 21, 1999
LFR Geologist: Thomas Zakaria, R.G., CH.G.

EXPLANATION

☰	Clay
⚋	Silt
▒	Sand
▨	Gravel

PID - Photoionization Detector

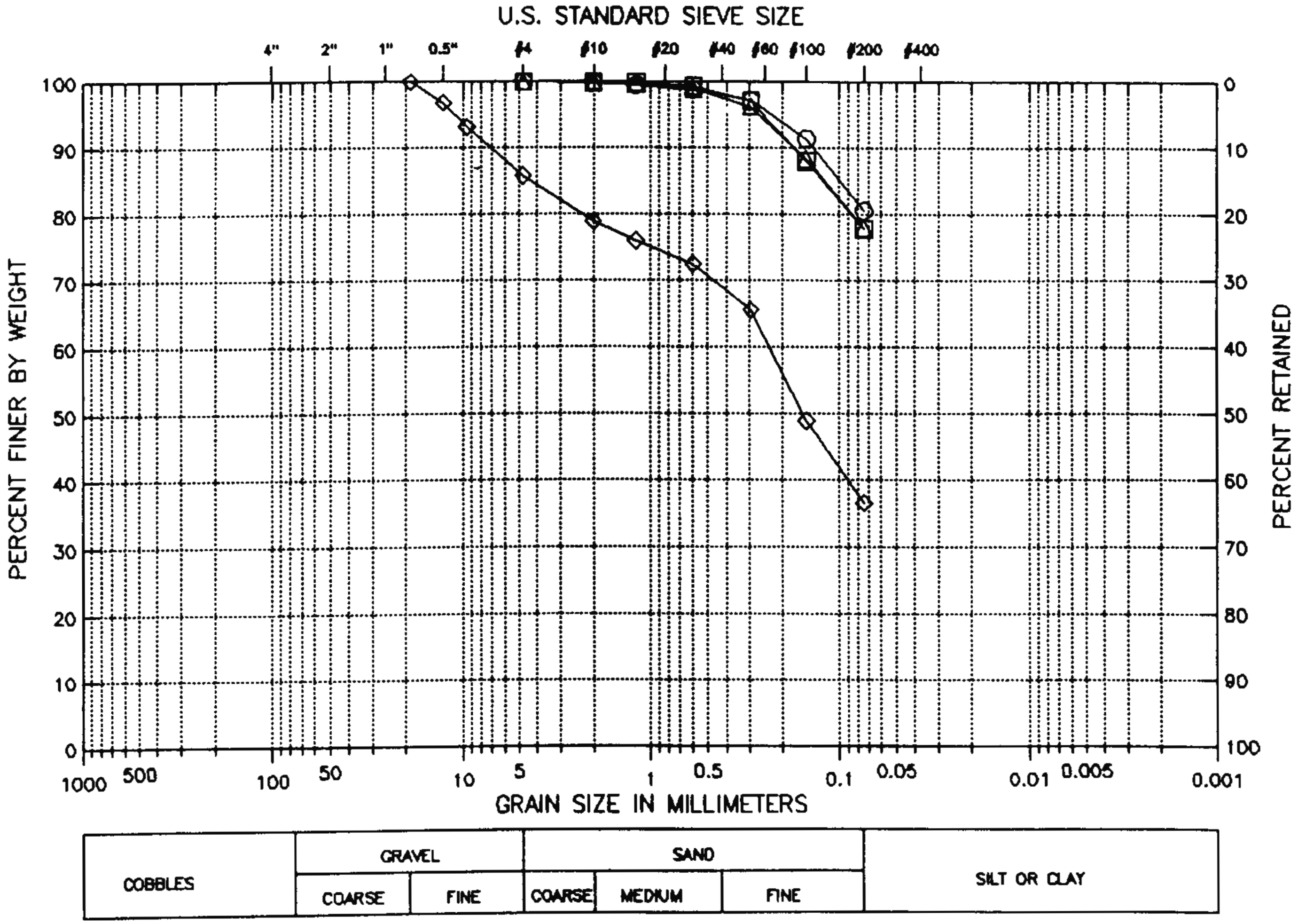
▼ Water level at time of drilling

LFR
LEVINE•FRICKE

LITHOLOGY FOR 437-BH-06 *(page 1 of 1)*

Project No. 6730.00-024

Project : LEVINE FRICKE RECON 6730.00-024
Project No.: 51-0016148A.00
Location: SCVWD MTBE STUDY MORGAN HILL, CA
Date : Tue Feb 23 1999



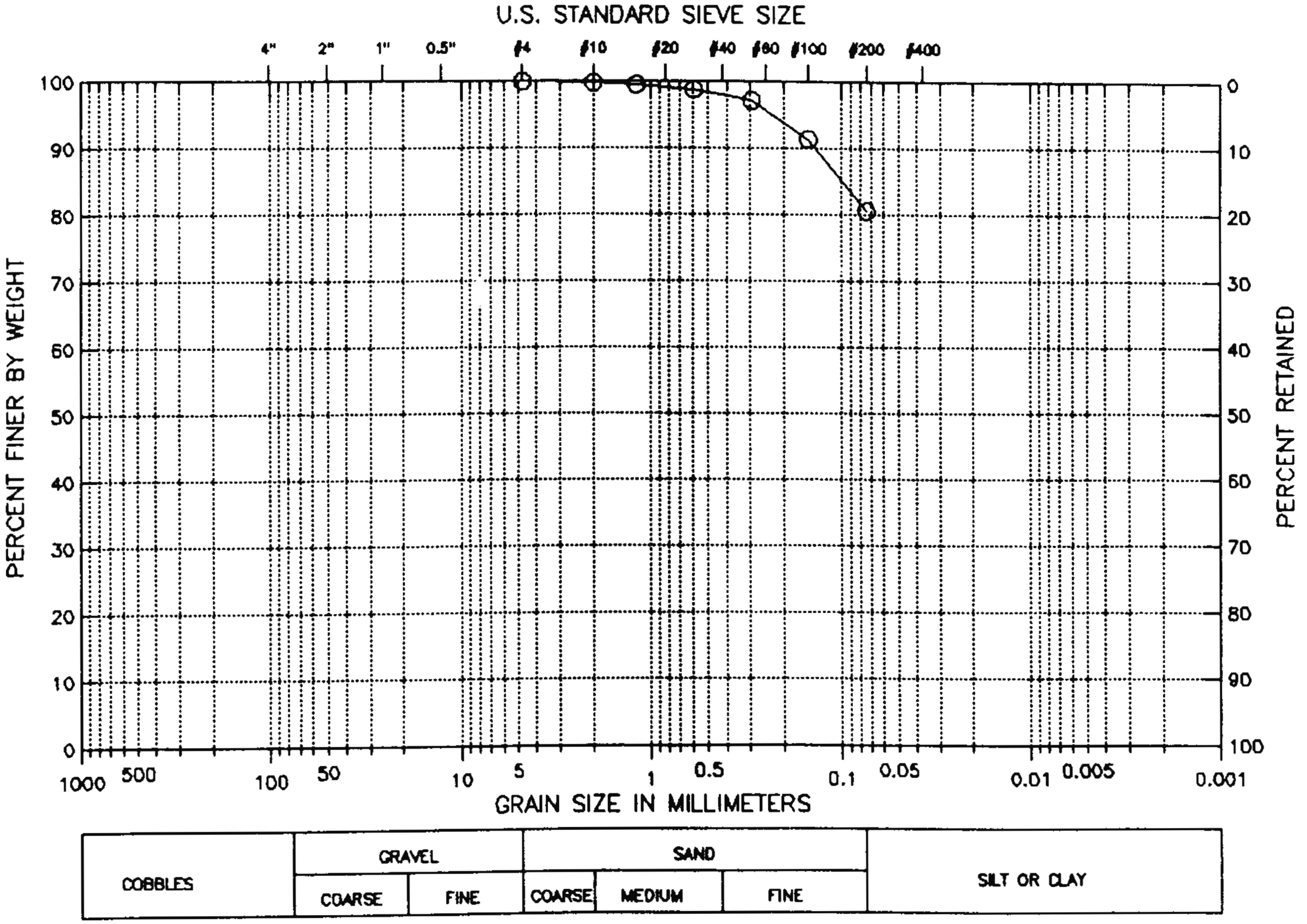
Symbol	Boring No.	Sample No.	Depth	Filename	Classification / Description
○	437-BH-04	12.0 SV	12.0 feet	437-12	BROWN FINE SANDY CLAY
△	437-BH-01	14.0 SO	14.0 feet	437-14	BROWN FINE SANDY CLAY
□	437-BH-03	15.0 SV	15.0 feet	437-15	BROWN FINE SANDY CLAY
◇	437-BH-05	25.0 SV	25.0 feet	437-25	BROWN CLAYEY SAND WITH GRAVEL

Figure 1

URS Greiner Woodward Clyde

Boring No. : 437-BH-04
Sample No: 12.0 SV
Tested by : C. WASON
Filename : 437-12

Project : LEVINE FRICKE RECON 6730.00-024
Project No.: 51-0016148A.00
Location: SCVWD MTBE STUDY MORGAN HILL, CA
Date : Tue Feb 23 1999



Classification :

Remarks :
Depth: 12.0 feet

Visual Description :
BROWN FINE SANDY CLAY

Figure 1

URS Greiner Woodward Clyde

URS Greiner Woodward Clyde

Tue Feb 23 10:28:04 1999

GEOTECHNICAL LABORATORY TEST DATA

Project : LEVINE FRICKE RECON 6730.00-024
Project No. : 51-0016148A.00
Boring No. : 437-BH-04
Sample No. : 12.0 SV
Location : SCVWD MTBE STUDY MORGAN HILL, CA
Soil Description : BROWN FINE SANDY CLAY
Remarks : Depth: 12.0 feet

Depth : 12.0 feet
Test Date : 02/23/99
Test Method : ASTM D422

Filename : 437-12
Elevation : NA
Tested by : C. WASON
Checked by : S. CAPPS

COARSE SIEVE SET

Sieve Mesh	Sieve Openings Inches	Sieve Openings Millimeters	Weight Retained (gm)	Cumulative Weight Retained (gm)	Percent Finer (%)
#4	0.187	4.75	0.00	0.00	100
#10	0.079	2.00	0.39	0.39	100
#16	0.047	1.19	0.67	1.06	100
#30	0.023	0.60	1.52	2.58	99
#50	0.012	0.30	3.61	6.19	97
#100	0.006	0.15	12.88	19.07	91
#200	0.003	0.07	24.16	43.23	81

Total Dry Weight of Sample = 222.9

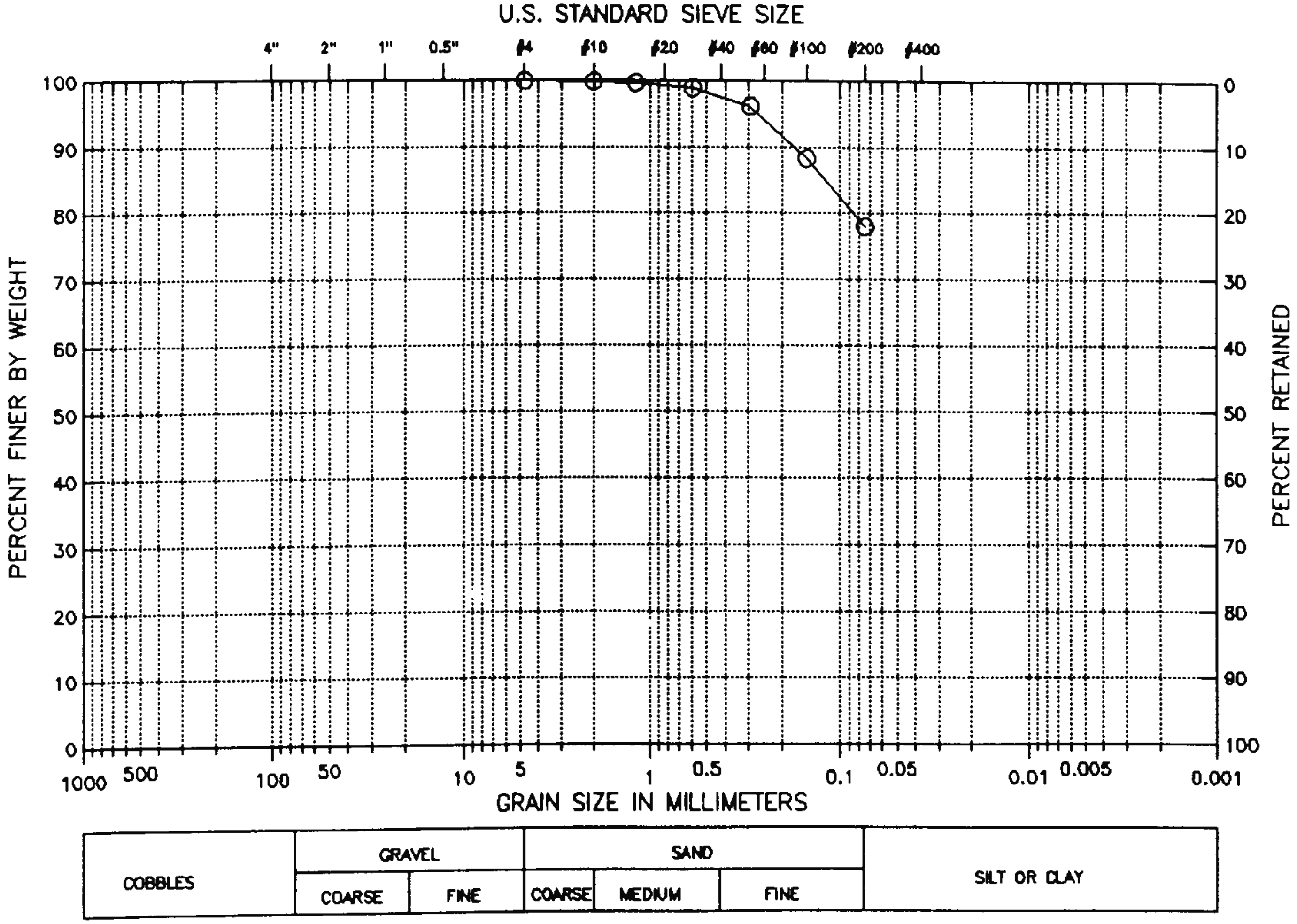
D85 : 0.0983 mm
D60 : N/A
D50 : N/A
D30 : N/A
D15 : N/A
D10 : N/A

Soil Classification

ASTM Group Symbol : N/A
ASTM Group Name : N/A
AASHTO Group Symbol : A-4(0)
AASHTO Group Name : Silty Soils

Boring No. : 437-BH-01
Sample No.: 14.0 SO
Tested by : C. WASON
Filename : 437-14

Project : LEVINE FRICKE RECON 6730.00-024
Project No.: 51-0016148A.00
Location: SCVWD MTBE STUDY MORGAN HILL, CA
Date : Tue Feb 23 1999



Classification :

Remarks :
Depth: 14.0 feet

Visual Description :
BROWN FINE SANDY CLAY

Figure 1

URS Greiner Woodward Clyde

Tue Feb 23 10:41:07 1999

GEOTECHNICAL LABORATORY TEST DATA

Project : LEVINE FRICKE RECON 6730.00-024
Filename : 437-14
Project No. : 51-0016148A.00
Depth : 14.0 feet
Elevation : NA
Boring No. : 437-BH-01
Test Date : 02/23/99
Tested by : C. WASON
Sample No. : 14.0 SO
Test Method : ASTM D422
Checked by : S. CAPPS
Location : SCVWD MTBE STUDY MORGAN HILL, CA
Soil Description : BROWN FINE SANDY CLAY
Remarks : Depth: 14.0 feet

COARSE SIEVE SET

Sieve Mesh	Sieve Openings Inches	Sieve Openings Millimeters	Weight Retained (gm)	Cumulative Weight Retained (gm)	Percent Finer (%)
#4	0.187	4.75	0.00	0.00	100
#10	0.079	2.00	0.26	0.26	100
#16	0.047	1.19	0.34	0.60	100
#30	0.023	0.60	1.86	2.46	99
#50	0.012	0.30	6.36	8.82	96
#100	0.006	0.15	18.53	27.35	88
#200	0.003	0.07	24.62	51.97	78

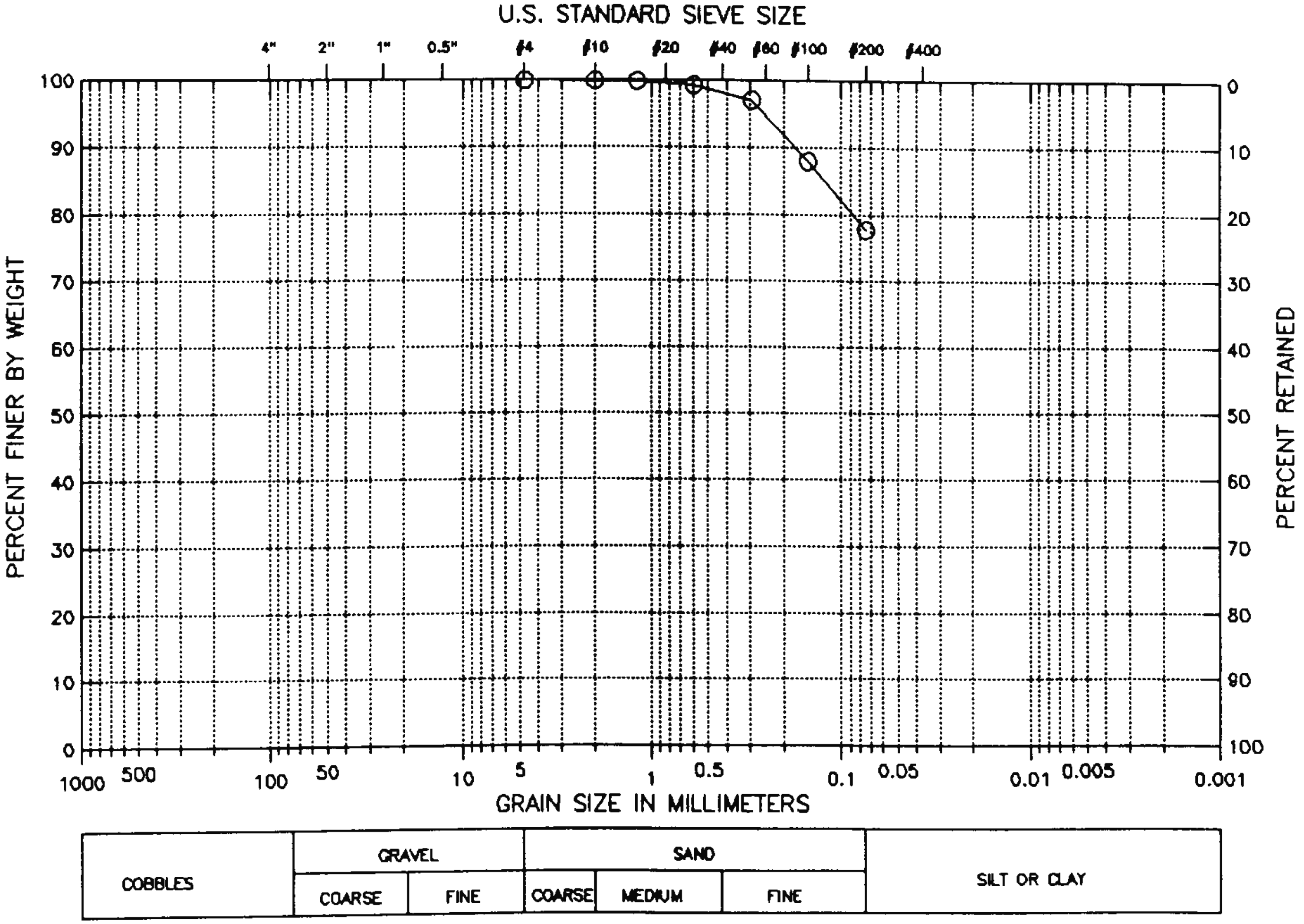
Total Dry Weight of Sample = 236.1

D85 : 0.1185 mm
D60 : N/A
D50 : N/A
D30 : N/A
D15 : N/A
D10 : N/A

Soil Classification
ASTM Group Symbol : N/A
ASTM Group Name : N/A
AASHTO Group Symbol : A-4(0)
AASHTO Group Name : Silty Soils

Boring No. : 437-BH-03
Sample No.: 15.0 SV
Tested by : C. WASON
Filename : 437-15

Project : LEVINE FRICKE RECON 6730.00-024
Project No.: 51-0016148A.00
Location: SCVWD MTBE STUDY MORGAN HILL, CA
Date : Tue Feb 23 1999



Classification :

Visual Description :
BROWN FINE SANDY CLAY

Remarks :
Depth: 15.0 feet

Figure 1

URS Greiner Woodward Clyde

Tue Feb 23 10:43:40 1999

GEOTECHNICAL LABORATORY TEST DATA

Project : LEVINE FRICKE RECON 6730.00-024		Filename : 437-15
Project No. : 51-0016148A.00	Depth : 15.0 feet	Elevation : NA
Boring No. : 437-BH-03	Test Date : 02/23/99	Tested by : C. WASON
Sample No. : 15.0 SV	Test Method : ASTM D422	Checked by : S. CAPPS

Location : SCVWD MTBE STUDY MORGAN HILL, CA
Soil Description : BROWN FINE SANDY CLAY
Remarks : Depth: 15.0 feet

COARSE SIEVE SET

Sieve Mesh	Sieve Openings Inches	Millimeters	Weight Retained (gm)	Cumulative Weight Retained (gm)	Percent Finer (%)
#4	0.187	4.75	0.00	0.00	100
#10	0.079	2.00	0.06	0.06	100
#16	0.047	1.19	0.25	0.31	100
#30	0.023	0.60	1.29	1.60	99
#50	0.012	0.30	5.85	7.45	97
#100	0.006	0.15	23.60	31.05	88
#200	0.003	0.07	26.35	57.40	78

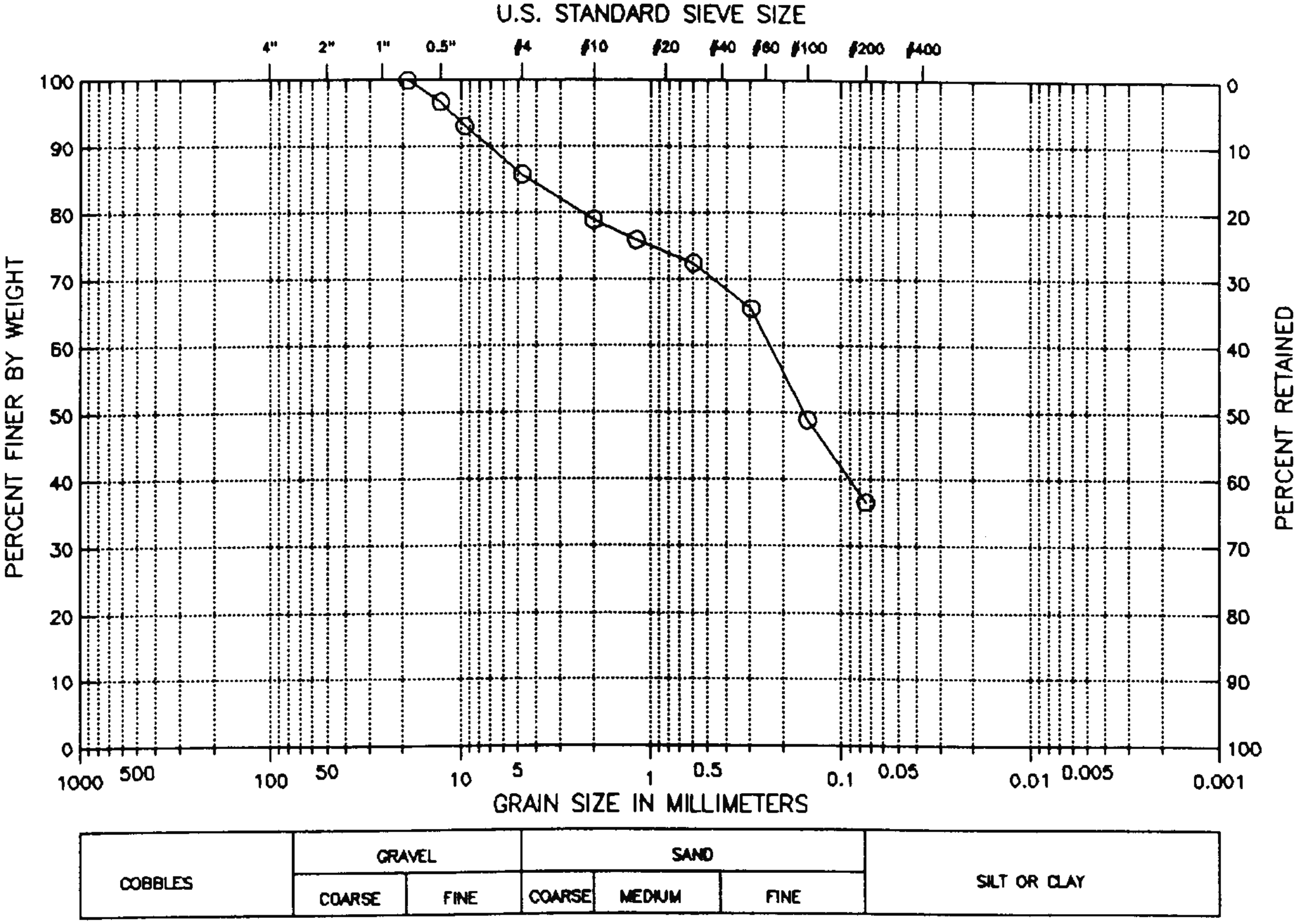
Total Dry Weight of Sample = 258.9

D85 : 0.1212 mm
D60 : N/A
D50 : N/A
D30 : N/A
D15 : N/A
D10 : N/A

Soil Classification
ASTM Group Symbol : N/A
ASTM Group Name : N/A
AASHTO Group Symbol : A-4(0)
AASHTO Group Name : Silty Soils

Boring No. : 437–BH–05
Sample No.: 25.0 SV
Tested by : C. WASON
Filename : 437–25

Project : LEVINE FRICKE RECON 6730.00–024
Project No.: 51–0016148A.00
Location: SCVWD MTBE STUDY MORGAN HILL, CA
Date : Tue Feb 23 1999



Classification :

Remarks :
Depth: 25.0 feet

Visual Description :
BROWN CLAYEY SAND WITH GRAVEL

Figure 1

URS Greiner Woodward Clyde

Tue Feb 23 11:07:29 1999

GEOTECHNICAL LABORATORY TEST DATA

Project : LEVINE FRICKE RECON 6730.00-024		Filename : 437-25
Project No. : 51-0016148A.00	Depth : 25.0 feet	Elevation : NA
Boring No. : 437-BH-05	Test Date : 02/23/99	Tested by : C. WASON
Sample No. : 25.0 SV	Test Method : ASTM D422	Checked by : S. CAPPS

Location : SCVWD MTBE STUDY MORGAN HILL, CA
Soil Description : BROWN CLAYEY SAND WITH GRAVEL
Remarks : Depth: 25.0 feet

COARSE SIEVE SET

Sieve Mesh	Sieve Openings Inches	Sieve Openings Millimeters	Weight Retained (gm)	Cumulative Weight Retained (gm)	Percent Finer (%)
0.75"	0.748	19.00	0.00	0.00	100
0.5"	0.500	12.70	8.10	8.10	97
0.375"	0.374	9.51	9.27	17.37	93
#4	0.187	4.75	18.46	35.83	86
#10	0.079	2.00	17.60	53.43	79
#16	0.047	1.19	7.39	60.82	76
#30	0.023	0.60	8.90	69.72	72
#50	0.012	0.30	17.55	87.27	66
#100	0.006	0.15	42.13	129.40	49
#200	0.003	0.07	31.34	160.74	37

Total Dry Weight of Sample = 253.4

D85 : 4.2674 mm
D60 : 0.2348 mm
D50 : 0.1557 mm
D30 : N/A
D15 : N/A
D10 : N/A

Soil Classification
ASTM Group Symbol : N/A
ASTM Group Name : N/A
AASHTO Group Symbol : A-4(0)
AASHTO Group Name : Silty Soils